COMPUTERWORLD

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NEWSPAPER

Two Software Types, One Way to Choose

By Don Leavitt
Of the CW Staff

CLEVELAND — Application and utility packages support the needs of very different kinds of people, but the basic approach to follow in picking either kind of package is similar, according to Thomas R. Finneran, an evaluation specialist with Sohio.

Although applications serve the business needs of an organization directly while utilities support the DP function — itself a service operation, the selection process starts when someone senses a problem and at least begins to define the requirements of the solution.

The definition of requirements for a utility may be simpler than for an application package, Finneran said, because the business requirements of a utility — as perceived by the DP-oriented user — often coincide with the technical requirements. Separating the two types of requirements is often more difficult when the problem is keyed to an application package.

Once the requirements have been clarified, the user and the analyst have to determine if there is a possible solution, he said. Before that can be determined, the boundaries of the possible solution — the hardware/software configuration then available — has to be considered, he noted.

Again, regardless of whether the problem is business- or DP-oriented, a cost/benefit analysis of the possible solution should be attempted. This is much easier for an application than for a utility, Finneran said.

CW Special Report on Utility Packages follows Page 40.

An application — accounts receivable, for example — can lead to direct dollar benefits. If monthly billings can be prepared earlier than before, cash flow will improve and the company's financial status will be enhanced.

Most utility operations lead to less easily defined, less tangible benefits: They make a programmer's work simpler, improve the throughput on the system or reduce the amount of memory required to do a job. But, Finneran asked, what is the dollar value of any of those benefits?

The benefits can be viewed in comparison with what the DP operation would be if the particular package is not acquired and that leads to "funny money" calculations, not real money in the bank, he said.

Finneran declined to say how long an evaluation process should take or how much it should cost compared, perhaps, with the cost of the packages being considered. One of the problems with setting any such arbitrary limit is that it fails to recognize the value of a package to an organization may have nothing to do with either the cost of the package or the cost of the evaluation.

Some of the classic arguments for acquiring packages, instead of creating the programs in-house, apply with special emphasis in the utility area, he said. Most installations simply don't have the in-house expertise to write, for example, their own sort routines.

Creation of a data dictionary system might be easier, he acknowledged, and a number of data centers might be able to put

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Changes Cause Errors

Davis Calls Software Tinkering Bad Idea

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — One of the worst notions the computer industry has sold to users is the idea that it is good to be able to tinker with software, Dr. Ruth M. Davis charged here last week.

Davis, director of the National Bureau of Standards' (NBS) Institute for Computer Sciences and Technology, said "we've sold the world on the concept that frequent changes in software mean improvements in processing."

While this is true, it isn't the whole truth, Davis told the Association of Data Processing Service Organization's (Adapso) 46th Annual Management Conference here.

Every time one change is made in a small area of a system's operating software, 10 errors are introduced, she said. Operating systems should therefore be altered only under rigid conditions, she contended, and any change should be documented so the user can always find the original software if the improvement is less than satisfactory.

Users need to determine how vulnerable they are in their dependence on software, she added, and treat that code accordingly — independent of how much it cost to produce or buy.

While software may give a system all its attributes, it also generates most of a DP installation's problems, Davis stated.

The unreliability of system software once the installation is up and running is but one reason why looking for substitutes for software is the most sensible move industry and users could make, she contended.

Software is also the most expensive part of any computer system and has been for the last 20 years, Davis noted.

In addition, users have little quality control over their software since they can't prove that it is correct by normal mathematical or logical means. There are some statistical and engineering control substitutes for good math and good logic, Davis noted, but these aren't widely used.

Vendors don't offer users warranties or guarantees for the software they sell. Further, there is only one validation service available to users — the Cobol validation service run for users by the federal government through the Department of Defense, she noted.

Not only does the software market pose a classic "buyer beware" situation, it also invites a user of a product into a lonely world in which there are no large groups of installations running the same package.

Finally, Davis said, software development and maintenance are highly labor-intensive. Sound management principles dictate that this reason alone should force the industry's search for software substitutes, she argued.

Such substitutes to software do exist and are gaining greater prominence, Davis pointed out. Hard-wired software contained in read-only memory and software on chips that people can't change are examples, she said. The NBS director also put automated software generators in the substitution category.

Areas of Creativity

"We don't want to get rid of creativity in programming," Davis told Adapso members, but applications programming and

(Continued on Page 4)

First Bubble Memory for Users Offered in Teleprinters From TI

By John P. Hebert
Of the CW Staff

HOUSTON — Magnetic bubble memories have found their first commercial application in the computer industry, but not in a multimillion dollar mainframe.

Texas Instruments, Inc. has integrated the mass memory storage medium into two automatic send/receive (ASR) versions of its Silent 700 series terminals after a three-year laboratory effort.

The TI 765 portable memory terminal and its desktop counterpart, the Model 763 memory send/receive, offer users a standard 20,000 bytes of nonvolatile memory storage expandable to 80,000 bytes in 20,000-byte increments, the company said.

When the power is disconnected or interrupted, the stored data is retained unaltered within the bubbles, which are microscopic, cylindrical magnetic "islands" on the surface of the semiconductor electronic material, TI explained.

At 17 pounds, the portable TI 765 weighs four pounds more than its standard memory version because of the additional hardware and circuitry associated with the magnetic bubble memory, according to a TI spokesman. However, the memory itself occupies little more than one square inch of space inside the terminal, he said.

This technology brings electronic data storage to terminal applications which formerly required the use of larger, more expensive media such as cassettes, paper tape or floppy disks, TI said.

Compared with electromechanical storage devices, bubble technology has the advantages of electronic reliability, higher access

(Continued on Page 4)

Post Office Warned Its Future Hinges on Electronic Messages

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — The U.S. Postal Service should join "at once" with private enterprise to use existing electronic communications for mail, a commission that has studied the service for six months recommended last week.

Warning that otherwise the post office's future may be bleak, the Commission on Postal Service said the service should also decide within two years if it can best serve the public by providing complete electronic message services.

However, another major recommendation in the report to the President and Congress may mean serious consideration of electronic message systems will be delayed or never carried out, sources indicated here.

That recommendation is the one calling for the retention of the Postal Service's Board of Governors and the continued appointment of the Postmaster General by that group. Both the board and the Postmaster General have been dragging their feet in implementing such systems, the sources said.

For example, the commission severely chastised the governors and Postmaster General for their failure to enter a joint venture proposed by Xerox a year ago to provide facsimile transmission of time-dependent mail.

In addition, the board has taken the position that electronic communications are simply "too revolutionary" to be considered.

Less than .2% of the post office's billion dollar budget goes into research and development, the sources also noted.

Furthermore, numerous outside studies commissioned by the Postal Service in the past have recommended electronic mail,

(Continued on Page 6)

States Lack DP Control: Nasis

By E. Drake Lundell Jr.
Of the CW Staff

LEXINGTON, Ky. — Lack of strong management support and involvement and missed programming schedules continue to be the major problems facing state DP operations, according to the National Association for State Information Systems (Nasis).

In addition, the group's annual report indicated that while state concern for privacy is growing, there is still a long way to go in this area.

The wide-ranging yearly report also pointed out that the rate of growth in computer installations in the states slowed in 1976 compared with 1975 and the pattern of centralized control of state information-processing capabilities continues.

In the area of problems facing state information-processing systems, 43 states indicated management understanding was a problem and ranked it No. 1 in the "external" problem category.

Lack of a definitive plan was cited by 41 states as the No. 2 major problem spot in the survey, and a lack of management commitment to information processing was mentioned by 42 states.

Another problem seen by the directors of state information systems was a lack of interest on the part of management, followed by a resistance to consolidation, user unfamiliarity with information systems, user-agency cooperation and the recruitment of

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Innovators Succeed

Users Urged to Consider All DP Solutions

By Don Leavitt
Of the CW Staff

CLEVELAND — Know your business and use the computer to satisfy business needs. Beyond that, don't be afraid to at least consider almost anything when looking for a solution to a problem, Terry Monaghan, of Borden Chemical, Inc. told a Computer Caravan Workshop here last week.

Describing how his Information Systems Group recently created a network of Digital Equipment Corp. PDP-11/70's linked through the firm's IBM 370/158s to support Borden's Consumer Products Division, Monaghan said the group was able to go from concept to production in less than six months because it worked closely with its users and with a range of vendors.

"IBM's 'cradle-to-the-grave' service is very comforting," he said, "but mini makers don't give you that kind of support. So, we had to go out on our own to find solutions to the problems we encountered."

Nonetheless, the basic vendor selection was the critical step and for that, Monaghan said he certainly got user management involved.

The system was intended to replace an old IBM remote job entry operation. It was to involve 10 installations in five states which, among other things, manufacture and sell Elmer's Glue, Mystic Tape, and Krylon paints.

Criteria Spelled Out

Monaghan invited all the comptrollers of the different subsidiaries who would be making the equipment selection to corporate headquarters in Columbus, Ohio, and there he spelled out the criteria he hoped they would consider in picking the hardware for the system.

The vendor's stability and experience in minis and their financial condition were very important. But so was their ability to provide proper field service and support when that was needed, especially in some of the more remote locations, Monaghan said.

Cost performance should be a factor, he said, but so should simplicity of operation, capability for expansion as the network grows, availability of application software and the reliability of the hardware.

The system also had to be capable of meshing with the remote job entry facilities on the IBM mainframes, processing timesharing applications and supporting data entry software, he said.

Since the comptrollers were not DP-oriented, Monaghan assigned a weight of 30% to the first vendor-specific group of criteria, 35% to the second general group and 35% to a third grouping related to the equipment's suitability to the problem at hand.

He then reviewed the three vendors he saw as "finalists" and had the comptrollers vote for their choices.

Once the DEC PDP-11/70s were picked, software development got under way and this covered both the applications to be run on the minis and the interfaces needed for corporate applications on the 370.

There were to be 12 major systems on the minis including order entry, "criteria pricing," credit checking, stock inquiries, stock status reporting, invoicing and "min/max" inventory control.

For some of the users, the "min/max" approach to inventory control was new, Monaghan said, but it seemed to work well once it was in place.

In one instance, he noted, a location "turned" its inventory five times a year before the system was installed, but was able to turn it 11 times annually with the help of the system since it helped the manager see how he could do a better job.

More Hardware Needed

But the DEC hardware by itself wasn't enough to satisfy Borden's needs, Monaghan indicated. Communications requirements including several 9,600 bit/sec leased lines led him to acquire and install a "Supermux" multiplexer from Infotron Systems Corp.

Monaghan upgraded the disk subsystem and added a dual port so locations with two of the 11/70s could share this resource.

A "Hasp box", based on a microprocessor from Software Results of Cincinnati, supported the remote job entry work going to and from the IBM mainframe.

Monaghan also turned to software vendors when that seemed useful. "We used anything we could find to shorten the development cycle," including a file access method acquired from Transom in Pittsburgh.

With the systems now in most locations, Monaghan estimated Borden is saving $240,000 annually with a complete return on the hardware and software investment within two years of installation.

Caravan Growing

NEWTON, Mass. — After only two stops on its nine-city tour, Computerworld, Inc.'s Computer Caravan is running 39% ahead of last year in number of attendees.

San Francisco's exhibition drew 4,125 attendees last year, 5,300 this year — a growth of 28%.

Los Angeles, however, is this year's star so far with a 48% increase in attendance, jumping from 4,311 in 1976 to 6,400 this year.

Post Office Fixing Kokomo Plan

WASHINGTON, D.C. — The U.S. Postal Service here is again developing standards for computerized evaluation of mail delivery routes, which it hopes will eventually reduce the letter carrier work force.

The Postal Service's plans suffered a setback last summer when an impartial labor dispute arbitrator ruled the standards then used in route evaluation were unfair to carriers [CW, Aug. 8]. He ordered normal delivery methods be resumed at Rose City Station in Portland, Ore., and Kokomo, Ind., the two "Kokomo Plan" test sites.

The Postal Service is presently working with time and motion studies, rather than force-fitting method/time/measurement studies borrowed from industry, to assure carriers put in a full day's work, according to a spokesman.

Computers will again be used to store route variables if and when a formal plan is adopted, he said, stressing the computer system did not and will not play a decision-making role in the route evaluation process.

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SUSPENSE

How did IBM's rookie sort do in its first meeting with "Lefty" SyncSort? Read all about it!

or Call (201) 568-9700

Get the inside scouting report.

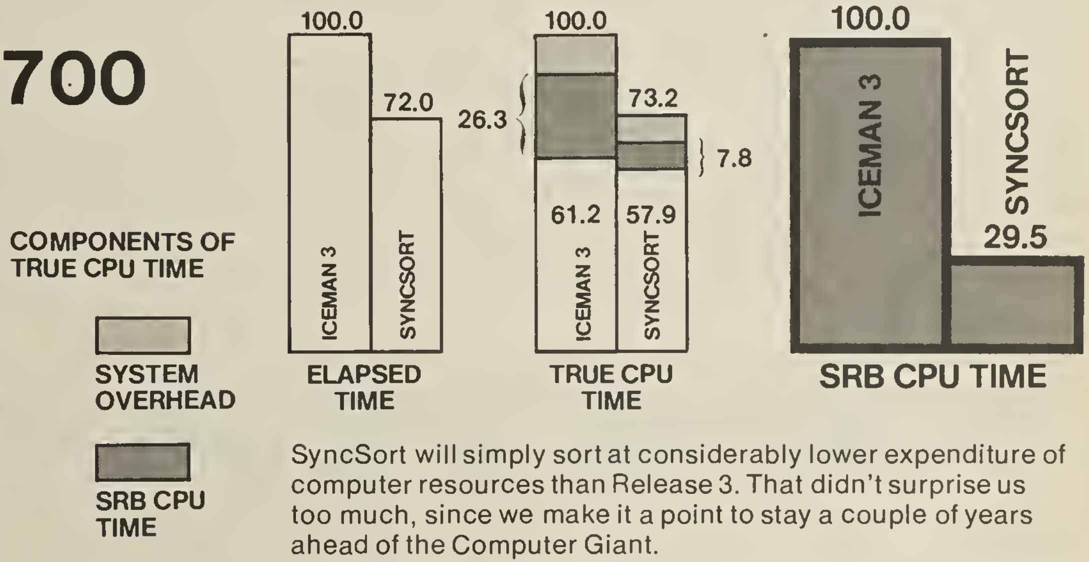
It is one of those historic moments in the Annals of Sort! The very first appearance in competition of IBM's new SM1-5740, Release 3, in the tough-as-nails MVS League. Will the kid be able to live up to his advance press notices?

Confidently ICEMAN 3 strides to the plate . . . knocks the dirt out of his spikes . . . hitches up his britches.

Then, as sorting fans everywhere gasp in amazement, he lifts his arm lazily and points toward the centerfield flagpole, thousands of bytes away. The kid is going to try to emulate Babe's mighty homerun shot!
Moments later, SyncSort winds up . . . a curving white blur is seen . . . and . . . and . . .

There is no joy in Armonk! ICEMAN 3 struck out every time it came to bat against the latest release of SyncSort III-and-a-half in a recent series of MVS benchmark tests. (In sorting, as in most other forms of human endeavor, it's a long way from baby to Babe.)

The bar charts below tell the story more eloquently than we can:



SyncSort will simply sort at considerably lower expenditure of computer resources than Release 3. That didn't surprise us too much, since we make it a point to stay a couple of years ahead of the Computer Giant.

But what really caused up to swallow our chaw was the amount of "Locked-up" SRB CPU Time in ICEMAN 3. SRB CPU Time is, of course, that portion of the True CPU Time which is uninterruptible. It directly affects the performance of other jobs in a multi-programming environment. The more SRB CPU Time a job uses, the more difficult it is for the CPU to accomplish its job of multi-programming.

In ICEMAN 3, SRB CPU Time amounts to a whopping 26.4% of the total. With SyncSort you can reduce that "locked-up" time by 70.5%!

We just thought you'd like to know that the rookie has a weakness for missing signals.

Of course, everything we've said about ICEMAN 3's performance applies to MVS. We'll soon be providing you with a form sheet on how the kid does in VS1, SVS, OS—

Hold it! Did we say OS? And you thought IBM wasn't supporting OS anymore?

That's funny. So did we!

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Selection Method Similar for Applications, Utilities

(Continued from Page 1)

one together. But the effort wouldn't be worthwhile since the cost of a packaged dictionary and its maintenance is far less than the cost of a do-it-yourself job.

Returning to the work required to define the requirements to be met by a package, Finneran said that might be easy, but weighing the significance of any of the requirements could be much harder.

A group of people from Sohio met at one time with people from another Cleveland firm, he said, and since they were all interested in the same kind of package, they split up the definition of requirements chores.

When they got together, they found they had good agreement on the requirements, but both the scoring and the weighing of the individual requirements suggested by the people from each company came out markedly different — as different as the organization of the companies themselves. And that's quite reasonable, Finneran added.

Approach to Consensus

Finneran said he had used a "modified Delphi" approach to gain a consensus on how requirements, once defined, should be judged. With this approach, each of several raters is asked for a private evaluation of the requirements.

When there is general agreement on the value of some of the requirements, they are dropped from a second rating cycle. At this time, Finneran tells each rater what the average rating on each requirement was and asks why his rating was different.

This is not a browbeating session, he emphasized. The differences should be the significant ones, regardless of any apparent consensus among the other raters.

A Narrow Line

There is, however, a narrow line between understanding the requirements needed to solve a problem and a bias for or against a package which destroys a rater's objectivity. Perhaps the best way to judge the value of a package being advocated by one person is to see how well it might help the company in a different setting, he said.

"Contact users of any package seriously being considered, but ask the hard questions that will really tell you how well the acquisition fits into each user's setting. Seek out the names of unhappy users. They may tell you more than the happy ones," he concluded.

TI Teleprinters Have Magnetic Bubble Memory

(Continued from Page 1)

speeds, smaller size, less weight and smaller power consumption, the company claimed.

Both the 763 and 765 terminal can access any indexed record in memory in less than 15 msec compared with a search time ranging from several seconds to several minutes for a cassette system, the spokesman added.

If the data location in the 763 or 765 memory is not indexed, the character string search speed is 1,000 char./sec, about four times the speed of a cassette search, he said.

Compared with a floppy disk, the bubble memory's indexed record access time is more than 10 times faster because the bubble looks like random-access memory (RAM), according to the spokesman.

Total data transfer rates are lower than those of a floppy disk which has accessed the record, he added.

Controlled by Micro

In addition to the bubble memory, both terminals rely on "some RAM" for immediate storage and read-only memory (ROM), the spokesman noted.

The bubble memory, RAM, ROM and all associated electronics are controlled by a TI TMS 9980 microprocessor, according to the firm.

With the integral bubble memory, a user can enter data on the terminal keyboard, store it over a period of time and transmit the information at 300 bit/sec through a built-in acoustic coupler on the 765 or up to 9,600 bit/sec through the standard RS-232 connections on either terminal, the spokesman said.

In addition, data can be transmitted at 1,200 bit/sec when the terminals are connected to a modem, he noted.

The Model 765 includes an upper/lower case Ascii keyboard with an integrated numeric cluster, a 30 char./sec thermal printer and the acoustic coupler, TI said.

The Model 763 weighs less than 16 pounds, it added.

Both terminals include a file management system and an operator command mode to permit users to select communications modes, configure memory and enter or edit text, TI said.

Deliveries of the bubble memory terminals are scheduled for the fourth quarter.

The Model 765 costs $2,995; the desktop Model 763 is priced at $2,695. Each additional 20,000-character memory increment is priced at $500, TI said from 12203 Southwest Freeway, Houston, Texas 77001.

Proposal Book Rocks Industry!

A California publishing firm has literally taken the computer industry by storm with a recently-published "how to" proposal book. The book, a 4½ pound loose-leaf volume entitled *How to Create a Winning Proposal,* covers every aspect of proposal preparation from start to finish, including the nuts-and-bolts details on how a winner is put together.

Written by two top West Coast proposal consultants, *Winning Proposal* is rapidly becoming the standard text for use in commercial, government and OEM proposal efforts. It is currently in use by 74% of the major data communications equipment manufacturers in the nation and 58% of the EDP management and service organizations.

Using a step-by-step instructional technique, the authors provide a virtual roadmap to the entire proposal process . . . including section-by-section checklists to ensure the proposal team of covering all the important bases. Excellent guidelines are given on the contents, structure and methods of preparation for both solicited and unsolicited proposals. A tactical approach is used for developing an effective "win strategy," mobilizing the proposal team, and controlling the input of the various team members. Detailed instructions on how to analyze and respond to RFP's, RFQ's, and IFB's are included.

Copies are available from Mercury Communications, Inc., 730-CW Mission Street, Santa Cruz, CA 95060. $55 (pre-paid) includes 3-5 day delivery inside USA. In Calif. add $3.12. For outside USA, U.S. $67 (Int'l money order) includes 7-10 day air delivery.

Software Tinkering Discouraged

(Continued from Page 1)

not minor improvements to operating system software is where the real creativity comes into play.

Projects like electronic funds transfer and the U.S. space program testify to the creativity of applications software, Davis said. Once creativity has been shown in programming for a specific application, why not fix on it and only permit future changes to be incremental?

The software could be evaluated for changes at fixed intervals such as every three months or once a year rather than daily or even weekly, Davis said. Further, goals need to be established to encourage users and industry to equate creativity with new applications and control with older developments in software.

Over the next few years, the federal government hopes to reduce the probability of errors in products delivered to it by 90% and, once the software is in production, NBS wants to see a 50% reduction in maintenance requirements, Davis said.

The federal government hopes to produce a software engineering handbook by 1978 and that year should also see software validation services operating for users of all the major programming languages, Davis told Adapso members.

Davis contended that quality control of software won't reduce vendor profits, but will reduce error rates and maintenance requirements, which should satisfy users and reduce the frustration level for software developers.

Newsletter Offers Negotiations Data

WINTER PARK, Fla. — "Computer Negotiations Report," a newsletter devoted to the problems of negotiating computer contracts, is now being offered monthly by International Computer Negotiations (ICN) here.

The newsletter will aim at providing computer users with the latest information on pricing, discounts, concessions, negotiating strategy and tactics, for example. It will also focus on things to look out for in negotiating a third-party lease, how to avoid contractual pitfalls in turnkey acquisitions and basic contract administration, ICN said.

The standard edition costs $125 per year. A sample issue can be obtained from ICN, P.O. Box 364, Winter Park, Fla. 32790.

ON ANY TRACK WE'RE HARD TO BEAT

When you talk about leasing an IBM/370, you are on a fast track. Each leasing company claims it has the best program for you. But does it? With over $200 Million of IBM/370 equipment on lease in the U.S. and overseas, Alanthus' customers are saving more than $17 Million annually. That's a real winner!

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But Says Cost Could Be Prohibitive

OMB Shows Support for Federal Grants Data Base Bill

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — The first show of support from the Office of Management and Budget (OMB) for a law that would create a data base to track the $71 million available in federal grants came in testimony here recently by the agency's new deputy director, James T. McIntyre.

But McIntyre's vote of approval was chilled by the warning that the cost of computerizing the data could "outweigh" the benefits.

McIntyre told the Senate Committee on Governmental Affairs the proposed system would increase reporting requirements all over the country at a cost that might be "prohibitive." No system now exists for gathering this information on federal programs on a comprehensive centralized basis.

At the same time, however, county, city and state organizations told the subcommittee conducting hearings on the proposed Federal Program Information Act, S. 904, that computerization of federal grant data "is sorely needed" and would mean more efficient management of the $71 billion in federal monies that will go to these areas in fiscal 1978.

Administration Support

McIntyre noted the Carter Administration supports efforts to make information on federal grants and loans "readily available at low cost and in an efficient manner."

As former budget director in Georgia, McIntyre added his personal commitment to improving the accessibility of information on federal programs.

Now, as deputy director of OMB, he favors this bill, sponsored by senators William V. Roth (R-Del.) and Edward M. Kennedy (D-Mass.), in its general concept and purpose.

OMB particularly approves of S. 904's consolidating the present hard-copy *Catalog of Federal Domestic Assistance* with the use of the Federal Assistance Program Retrieval System (FAPRS), developed within the Department of Agriculture, McIntyre said.

Currently in the process of implementing zero base budgeting and developing the reorganization plan for the government, OMB contends its willingness to expand its role in both the catalog and in FAPRS indicates the high priority the agency places on the goals of S. 904, McIntyre added.

S. 904 would require the government to make available to grant applicants current information on the amount of funds not already obligated or otherwise committed.

In addition, the bill calls for financial information on current money awards, identified by program number, title, recipient, amount, date of award and geographical location [CW, April 11].

"From my experience in Georgia, I am, of course, well aware of the intent of these proposed requirements," McIntyre said. "Applicants do not want to waste their time applying for programs for which the funds have been exhausted."

But the OMB deputy director doubts that the bill's solution to this problem — which would call for program managers all over the country to report the grant data for which they are responsible — would result in one reliable body of financial information.

OMB envisions the need for standardized account systems, reporting systems and a mass of additional reports flowing through its doors, McIntyre said. He believes grant applicants can determine the availability of funds by going to the federal program manager listed in the catalog.

"I realize it is the intent of the committee that the catalog rely on modern data processing to the maximum extent possible, and we fully support this approach. However, computers alone cannot meet this requirement. It would take hundreds of individuals throughout the country operating a new reporting system to transfer this information into a central data base."

After listening to McIntyre, Roth said he appreciated the Administration's support, but added that "anything short of giving the people back home the financial information on these programs means not meeting their needs."

The senator also noted the Federal Paperwork Commission has endorsed the concepts embodied in the proposed system. "Rather than add to OMB's paperwork, this system should lighten it," Roth said.

OMB's reaction to S. 904 and its financial information requirements was "an honest one," according to a source close to the agency. OMB views the creation of an accounting system that would track federal money on a geographic basis as a very expensive process — one that could cost as much as half a billion dollars, the source said.

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MONTVALE, N.J. — A special travel service is being offered to individuals planning to attend the 1977 National Computer Conference (NCC) in Dallas.

The service will assist attendees in arranging all air and ground transportation, with savings up to 35% on airfare in some cases.

A plan for individual travel is available from Los Angeles, San Diego, San Francisco, Montreal and Toronto. It allows stopovers for cities enroute for an additional charge of $15 per city and provides savings up to 30% on airfare, according to the American Federation of Information Processing Societies (Afips).

A second plan provides savings up to 35%. It is based on group airfares which require a minimum of 10 travelers on the same flight to a maximum of 40.

All arrangements must be made 30 days in advance, Afips noted.

Individuals who wish to combine other travel with attendance at NCC on June 13-16 can save $103 if they are traveling to the West Coast from New York, or vice versa, with a stop in Dallas.

For more information, a toll-free NCC travel information hotline has been arranged by Afips — 800-556-6882 (in Rhode Island call 401-943-5061).

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Study Cites Major Problems of State DP Operations

(Continued from Page 1)

qualified personnel.

In commenting on the findings, Nasis said "a lack of top management concern regarding the information systems resources creates by far the most troublesome problems over which the [DP] manager has no control.

"At the same time, it is probably the lack of this interest which leads to the absence of a definitive long-range plan."

Internally, "missed programming schedules continued to be the No. 1 problem that plagues the DP activity and for which the manager has direct responsibility," Nasis said. More states considered this problem more severe in 1976 than in 1975, the report noted.

High costs were rated as the No. 2 internal problem faced by states with 39 states identifying this as a problem.

Other internal problems included cost overruns, inflexibility of programs, programming backlog, missed production schedules, poor input control and poor systems/program documentation, according to the report.

Security and Privacy

In the security and privacy area, the report noted the privacy issue was "given a great deal of lip service; however, there seems to have been very little concerted movement at the state level to develop any official policy or to enact any concrete legislation."

It further noted only eight states had legislation covering the overall area of privacy with regard to state information systems.

There are now more programs to properly audit security measures in state DP centers than there were a year ago, the report said. "However, there is no cause to think that all that can be done in this area has been done," it added.

On the physical security side, 93% of the states now have a physical security plan and 60% have a plan to audit the procedure.

But only 40% of the states indicated "they have a total data security plan and, of these, 78% are enforcing the plan and only 63% are providing for the audit of such plans," Nasis said.

"There is cause to wonder why, if a security plan is developed, its enforcement and auditing does not follow as an automatic action," the group added.

Installations

The number of installed computers in the states rose only slightly from 599 to 603 between 1975 and 1976, according to the report, with the greatest increases coming in the small and minicomputer classifications.

There were 161 large systems installed in 1976 compared with 159 in 1975; 169 medium systems in 1976, 189 in 1975; 222 small systems in 1976, 212 in 1975; and 51 mini systems in 1976, 39 in 1975.

Overall, 58% of the systems were leased while 26% were purchased machines and the remainder were installed on a lease/purchase contract, according to the report.

Other Findings

In the area of personnel, the study found that while the number of people working for state DP centers increased slightly (4%), personnel costs as a percentage of total state DP expenditures "declined significantly" (from 52% in 1975 to 48% in 1976).

At the same time, the report said there were approximately 44,700 people involved in state DP activities and the total expenditure on personnel during 1976 was between $375 million and $400 million.

Most of the people (in numbers) are in the data entry classification (41%); operations personnel account for 21% of the total; systems programming is 27% and management is 11% of the total.

Of the personnel trained in 1976, 56% were trained in-house and vendor training accounted for only 13%, the report said.

Meanwhile, hardware continued to decrease as a percentage of overall budgets, falling from 35% in 1975 to 33% in 1976, the report said.

In another area, "there was a general increase in the number of states with formalized written procedures for procuring hardware, software and contractual services," with 44 having guidelines for hardware, 43 for software and 41 for services.

In addition, 24 states now report using data base management systems. The federal government assisted in the development of 229 applications in 29 states and only 19 states have a formal relationship with local governments in the development of information systems.

Finally, the report noted "the ratio of DP budgets to grand total state budgets was .64%" on the average with the variation among states ranging from .29% to 1.86%.

Post Office Warned Its Future Hinges on Electronic Messages

(Continued from Page 1)

but have been ignored by the service, the sources said.

However, hearings on the commission's report scheduled by various congressional committees over the next three months may push the Postal Service's reluctant management toward a more careful consideration of electronic mail, they added.

Private Couriers Urged

The commission also recommended that where the Postal Service cannot provide the needed expedited service, private couriers should be permitted to carry mail, a practice which is now prohibited.

First class mail, the largest and most lucrative of all mail classes, faces major competition from electronic communications systems, the commission reported.

Nearly 25% of first class mail volume — much of it financial transactions — will probably be diverted to electronic transmission systems by 1985, the commission said, citing research by Arthur D. Little, a consulting firm.

The commission emphasized that the growth in electronic communications is not primarily motivated by a desire to avoid postage costs, but rather by a shift from communications based on paper to more economical electronic systems.

The federal government itself is moving into electronic transfer of Social Security, Supplemental Security Income, Civil Service Retirement, Railroad Retirement and revenue-sharing payments to citizens and city and state governments (see story on Page 7).

If the Postal Service procrastinates until a significant volume has been diverted and the magnitude of the impact can be verified, it will be too late for them to take positive action, the report stated.

To date, the Commission said, the Postal Service's planning for entry into electronic communications has low priority, little money, no organizational stature and only a modest top management commitment.

A short-term venture into electronic communications with private enterprise could help determine public communications needs and, at the same time, employ the unique collection and delivery network and trained work force of the post office, the report said.

Among the short-term electronic ventures suggested by the commission was a same-day premium mail delivery facsimile service within the U.S.

Such electronic services should be publicized and marketed in major cities, the report recommended.

For the long term, a nationwide federally regulated electronic communications enterprise would most likely succeed in achieving the economies of scale necessary to support a system managing both hardcopy and electronic communications, the commission predicted.

The volume of profitable mail is not growing, the commission indicated. In 1985 the Postal Service will move approximately 56 billion pieces of mail — essentially the same amount it carried in 1972.

In effect, the total growth potential in Postal Service volume that might have been produced in prior decades through increases in population and households is likely to be diverted to electronic forms of communications during the coming decade, the commission wrote.

The commission also suggested that mail delivery be reduced to five days a week and that Congress increase public service appropriations for the post office based on 10% of its expenses in the preceding fiscal year.

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Direct Deposit Program

U.S. Treasury Pushes EFT for Federal Pension Checks

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — The U.S. Treasury Department has stepped up efforts to advertise the advantages of electronically depositing Social Security and other federal retirement payments through Project Spredd — Systematic Promotion of Effortless Direct Deposits.

The federal government has already encouraged nearly six million people to sign up for this, its biggest effort in electronic funds transfer (EFT) to date. Payments to these recipients alone come to approximately $1.5 billion monthly, a Treasury spokesman noted.

Recipients of Social Security, Supplemental Security Income (SSI), Civil Service Retirement and Railroad Retirement payments are now eligible to participate in the direct deposit program. The EFT system will be extended this month to recipients of Veterans Administration (VA) compensation and pension payments in Georgia and Florida, with plans to make it available to all those receiving VA compensation and pensions by next fall.

Project Spredd is intended to bring a greater number of people into the direct deposit program more quickly, relieving them of worry over lost or stolen checks and the need to wait first for the mail delivery and then in bank lines to deposit the checks, according to Lester W. Plumly, head of the program in the Office of the Fiscal Assistant Secretary.

Spredd is determined to make signing up for direct deposits simple, he said. The payment recipient can arrange for the service at his commercial bank, savings bank, savings and loan association or similar institution. Recipients can also go through federal- or state-chartered credit unions where sign-up forms are available.

Treasury officials believe direct deposit will be particularly attractive to inner city residents. There, elderly recipients frequently live in fear of losing their checks or being beaten and robbed for them, the spokesman said.

Payments Go Through ACHs

Virtually all payments in the direct deposit program are handled through automated clearinghouses (ACH) that are located throughout the country. Legally and operationally outside of the Federal Reserve System, most ACHs use the computer systems of the local Federal Reserve offices to process the payments, Plumly said.

The only exceptions to this rule are the New York City and Chicago ACHs, which have their own systems, he added.

The 12 main and two dozen branch offices of the Federal Reserve use IBM and Burroughs mainframes to handle these processing tasks, Plumly stated. The "Fed's" business is about evenly split between these two vendors.

Payment data travels through the Federal Reserve's EFT system on magnetic tape; deposits are made to recipients' accounts in a matter of two or three days, he explained.

In a Chicago pilot effort, Treasury representatives have been meeting with officials of the Chicago Mayor's Office for Senior Citizens and Handicapped, the suburban Cook County Agency on the Aged and other local social service organizations.

In May, Treasury will include check stuffers with all Social Security, SSI, Civil Service Retirement and Railroad Retirement checks to explain the benefits of direct deposit, the spokesman said.

Congress authorized the direct deposit program in 1972. Treasury and the Social Security Administration began pilot operations in November 1974 in Georgia. The program was extended to all Social Security and SSI beneficiaries in that state in 1975.

In 1976, Georgia recipients of Civil Service and Railroad Retirement payments could bypass checks in the mail as well.

Since Treasury began to expand this program to serve the entire nation in February 1976, the federal government has made a total of 38.3 million EFT payments, Plumly said.

Treasury has a goal of 18 million monthly direct deposits by 1981. Ultimately, the program is expected to save taxpayers over $25 million annually.

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Under Attack

WASHINGTON, D.C. — The DP services industry is going to be one of the major industries hit by state drives for increased revenues through sales taxes, attorney Sandy Goldberg of Roberts and Holland told attendees at the Association of Data Processing Service Organizations (Adapso) meeting here last week.

Defense is going to cost money, he warned. The industry may decide it needs lobbyists in key states, he told a general session of the 46th Management Conference.

The trend seems to be that "we're winning in the South and losing in the North," he said.

Goldberg, who has been retained by Adapso in an advisory capacity, appealed for help in keeping abreast of situations in all states and asked people to send in letters of assessment or notices of "deficiencies."

Group Mulls Ways to Wage Tax Battle

By Molly Upton
Of the CW Staff

WASHINGTON, D.C. — Retroactive taxes on software products should be fought, attendees agreed at the Association of Data Processing Service Organizations (Adapso) Tax Committee meeting here last week, but there was less agreement on how to carry on the fight.

Lee Keets of Turnkey Systems, Inc. convinced the group it needs to study the ramifications of attacking the taxation issue from a particular angle, such as intangibility, in order to prevent "meeting ourselves coming around the bend" on other issues such as qualifications for investment tax credits.

Areas that could be affected by definitions of software as tangible or intangible property are income taxes and obtaining funds from the Export/Import Bank.

Some attendees indicated a reluctance to provide funding to Adapso for its tax efforts until a list of priorities has been established.

They also felt there should be clarification of the central Tax Committee's role as an information source since it was being derided for its inertia in directing actions in certain states, such as New York.

CW
At Adapso

Another suggestion called for the central committee to evolve long-range policy and leave fighting the "brush fires" in individual states up to the groups directly concerned.

Frank Wagner, president of Informatics, Inc., suggested the local committees fighting taxation in individual states no longer be referred to as Adapso tax subcommittees, but rather by a name suggesting independent action.

Essentially they are not under the direction or control of the central Tax Committee, he pointed out, and it is conceivable that cases argued under the Adapso banner in one state could be used to counter later cases elsewhere.

Lack of Action

Much of the discussion was devoted to the different approaches available in fighting state sales taxes.

Attendees expressed a fair amount of discomfort at the lack of action by the New York State group.

Robert Sherin, president of Nova Computing Services, Inc., called the lack of action in New York a "no win" approach. The New York situation is a real "Pearl Harbor" since the group is allowing laws to be made without its participation, he said.

Sherin recommended using the Administration Procedures Act (APA) as a quick and effective means of resolving the issue. Under the APA, one need not be a lawyer to protest a ruling nor wait for an opening on a court calendar, he explained.

The New York group has been waiting for a clarification of the state regulations, which the state has postponed twice, according to attorney Sandy Goldberg of Roberts and Holland, a New York law firm retained by Adapso for advice.

Wagner suggested petitioning states for a clear-cut definition of material covered by their sales taxes.

Situation in California

Reports on situations in New York, California, Missouri and New Jersey were made, while others mentioned taxation situations in Connecticut and Vermont as well as Wisconsin.

The group in California is prepared to go to court and consolidate potential cases involving nearly every aspect of DP services and software except for time-sharing, which is not being taxed.

When Larry Finch, president of General Business Systems, Inc., heard New York has an APA, he suggested perhaps the California group could help support action in New York that would serve as a helpful precedent, since the decision would be forthcoming much sooner. California does not have an effective APA, he said.

The California sales tax will probably rise to 9% within the near future, Finch said, citing recent estimates by the state legislature.

Other areas such as accounting are not being taxed and this is discriminatory, he indicated.

The California group is asking for some "seed money" from Adapso and the use of the Adapso name to enable it to enlist support from other organizations, he said. Finch estimated the battle could cost $250,000.

June 9 Meeting to Focus On International Theft

NEW YORK — Finding and prosecuting those who have stolen trade secrets is difficult enough a task when it happens domestically. But it is infinitely more complicated when it occurs across borders.

The Congress on International Technology and Information Theft will feature a defector here on June 9 who was directly involved in such activity as a dramatic example of just how difficult the problem can be.

The congress will focus on the use of government intelligence agencies in technology theft, "research protection," insurance coverage in technology, licensing procedures for maximum security, international law and technology theft.

The one-day congress costs $225 for the first member of a company and $190 for the second. More details are available from de Hellerman & Co., Inc., 137 E. 36th St., New York, N.Y. 10016.

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While Improving Privacy

On-Line Criminal Record System Reducing Paperwork

By John P. Hebert
Of the CW Staff

ROCHESTER, N.Y. — A consolidated criminal record system has gone on-line here to reduce paperwork while it tracks offenders from arrest through adjudication by the courts.

The Program for Systems Performance, Evaluation and Research (Prosper) will serve 13 different criminal justice agencies within Monroe County, according to Harold Salis, executive assistant for administration of the Seventh Judicial District.

Based on the county's IBM 370/165, Prosper supplies a common data base for all the county's criminal justice agencies.

In addition, it generates reports, retains statistics for future research projects and supplies the state with unformatted tape records of information purged from the system, Salis explained.

While cutting down on the amount of paper which was previously needed to track criminal suspects, Prosper is also improving the privacy of both those indicted or acquitted, he stressed.

Purged After Decision

Records are now kept on disk from the time of arrest until the case has been decided, Salis said. They are then put on tape and kept until 30 days after the decision is handed down. The information is then purged and the tape is sent to the state, he added.

When the city police arrest a suspect, they create a file on their IBM 370/155-based information system for that person including his name, time of arrest, charge, arresting officer and other relevant information.

"Basically," Salis said, "once the Rochester Police arrest a suspect, that's it. Prosper builds on that original information, cutting down on duplication efforts."

Each morning, the information on all arrests for the previous day — from 150 to 250 — are transmitted to Prosper over dedicated lines and a court arraignment file is created on disk, he said.

The record then essentially becomes the function of a city clerk user and remains in the system until the case is decided in court.

An hour or two after the court appearance, the individual's record is updated on Prosper's IBM 3270 CRTs. The completed information is retained by the system for 30 days.

And, Salis continued, if the accused was acquitted, then all of the court records in Prosper are immediately purged — in contrast with the old system.

"Because of old circumstances with the manual system and tradition, the court clerks didn't know what cases were being scheduled for court. Now they know," he said.

Prosper has improved the recordkeeping process by dismissing the acquittals. "There are no bits and pieces of information on an individual floating around that is unrelated to open cases. It's the best protection of privacy," he said.

In addition, the physical location and design of Prosper terminals contribute to improving privacy, he said.

First, every piece of hardware is located "within the bowels of a particular user's department."

There are also hardware locks. Users need a password to gain access to information in the recordkeeping system and some transactions are restricted to certain terminals, Salis explained.

All of the Prosper terminals — IBM 3270 CRTs and 3284 printers — are hard-wired to the mainframe operating under IBM's Information Management System. They are located either in the County Office Building, which houses the CPU, or within a three-block area.

Users include the county court, prosecutor, probation office, defenders, jail, supreme court, the city and county clerks. A total of 11 "inside" and two "outside" agencies are provided with some kind of information from the system, Salis said.

"And we have the capability to go beyond the present users and service all of the town courts in the county if they have a terminal and a leased line," he added.

At present, about 90% of all the active and inactive cases have been logged on the system as it is converted from a manual to a computerized system. The cases, Salis said, are filed by judge.

And the only trouble spot has been with the volume of arraignments in city court. Each day a calendar of cases is updated and, because there are 150 to 250 arraignments each day, "there is no wall big enough to hang the calendar," Salis noted.

Also, with 35 agencies receiving copies of the calendar, and because only three cases can fit on a page, the 3284 printer is inadequate.

Salis suggested modifications would have to be made to get more arraignments on a page. But, even with the limitations, it's better than the arrest list the county court would get from the Rochester Police Department, he maintained.

South Carolina 10th State To Join NCIC/CCH System

WASHINGTON, D.C. — South Carolina has become the 10th state to enter and update records in the National Crime Information Center's (NCIC) Computerized Criminal History (CCH) system maintained by the Federal Bureau of Investigation.

The other nine states that are now fully participating include Arizona, California, Florida, Illinois, Michigan, Nebraska, North Carolina, Ohio and Virginia.

Directory Lists Consultants

LOS ALTOS, Calif. — A directory of consultants and independent business and technical professionals living in northern California is now available from the Professional and Technical Consultants Association (Patca) here.

The directory lists more than 100 consultants and specializing electronics, computers, software, magnetic recording and optical systems to management, marketing, marketing manufacturing and finance.

The directory costs $2 postpaid from Patca at 1 First St., Los Altos, Calif. 94022.

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Says McFarland Forced Out of Post

DPMA Chapter Protests 'Ouster' of Executive Director

By Kenniston W. Lord Jr.
Special to Computerworld

COLUMBUS, Ohio — T. David McFarland, former executive director of the Data Processing Management Association (DPMA), did not "resign" — he was forced out of his job in favor of Edward J. Palmer, according to a letter of protest sent by the DPMA chapter here to its regional vice-president, Ross Fogle.

The whole thing was staged by the national Corporate Operations Committee (COC) before the DPMA's annual meeting, Info/Expo, last October without the knowledge or consent of the association's Executive Council, the letter charged.

'Unethical Removal'

The letter was written "to document our view of the distasteful and apparently unethical removal" of McFarland, three officials of the Columbus chapter said. They are Roger Woerner, president, Robert Shafran, international director, and Michael Sutin, secretary.

Palmer replaced McFarland as the DPMA's executive director effective Nov. 15. Announcement of the change was made in the December issue of the organization's publication, *Data Management*.

A copy of the minutes of an Executive Council meeting held Feb. 17 indicated 40% of that body objected to the manner in which the COC handled the affair, according to Richard Gehrt, a member of the council.

COC Abused Power

The Columbus chapter feels the COC abused its power, Shafran said. "The COC's responsibility to the membership was not evidenced when it appointed Palmer and forced the resignation of McFarland in a clandestine manner," he contended.

Efforts by the Executive Council to have the situation clarified have not brought a response, he added.

As a result, the local chapter has called for the "resignation or forced removal of all responsible parties, including Palmer."

"Why should DPMA members be required to live by a code of ethics to which their leadership apparently does not subscribe?" Shafran asked.

According to Gehrt, the COC has the authority to fire an executive director. Did it have the authority to hire another? According to Gehrt, the bylaws are "ambiguous" on the subject.

McFarland was replaced because "it was just felt that in the managerial handling of the association someone else could do a better job," Gehrt explained.

But "a little more confidence could have been put into working with the Executive Council relative to why they felt that [McFarland's] management capabilities were not up to par as they assumed par to be.

"What hurt was that after [Info/Expo] all the 270-some internatinal directors left feeling DPMA was on the road to recovery and it was a difficult thing to accept in the weeks following to find that there were some things wrong with the management of the executive director," he added.

Asked to Resign

McFarland confirmed by telephone that he was asked for his resignation on Friday, Nov. 12, during a meeting with DPMA President Robert J. Marrigan and former President J. Ralph Leatherman. He was let go with three months' pay and is now employed by a Chicago-based management firm.

McFarland said Marrigan and Leatherman told him on Nov. 12 that Palmer would be brought into the organization either as executive director or as assistant to the president. McFarland was also advised it was within his right to remain in his post, but his salary would be cut and Palmer, Leatherman and Marrigan would "make it rough on me," he said. He therefore resigned.

No Performance Review

Was McFarland's performance unsatisfactory? According to McFarland, Leatherman had never reviewed his performance.

When contacted by telephone recently, COC members Leatherman and Delbert W. Atwood Jr. both said it would be inappropriate to comment.

Marrigan defended the COC's replacement of McFarland as being within DPMA bylaws and added the matter was resolved at the Executive Council meeting and "there is no problem with the whole situation whatsoever."

As for an assessment of McFarland's performance, Marrigan responded, "That's a personnel matter and, as involved in privacy as I am, that's the last thing I want to talk about."

Marrigan said he was "unaware" of the letter from the Columbus chapter, although *Data Management* staff member Bill Zalud acknowledged he knew of the Columbus action. Telephone calls to Palmer were not returned.

Highly Regarded

A sample of the opinion of several DPMA members indicated McFarland was highly regarded. According to sources, he assumed the reins of leadership from his predecessor in a time of crisis, both fiscally and politically. Membership had plummeted from a high of 25,000 to approximately 20,500, and many DPMA programs were losing money.

To compensate for reduced revenue, the sources indicated, McFarland cut headquarters staff from 23 to 17 to administer a $1.3 million budget and provided increased — not decreased — membership services. Within a short time membership was again climbing, the quality of *Data Management* was returning and liquid assets again began to accumulate, they said.

The Columbus chapter has determined to make an issue of McFarland's ouster. In the meeting of its board of directors on April 4, members voted to nominate him as DPMA's "Computer Sciences Man of the Year."

While critics will state that McFarland is not a "Computer Sciences Man" at all, Columbus contends McFarland's contributions to the association itself more than merit the nomination, Shafran said.

Sources indicated at least one DPMA region is upset enough to have begun discussions with another "more ethical" organization regarding withdrawing from DPMA and associating with the other group.

Unauthorized Computer?

PARK RIDGE, Ill.— One of the professional societies in the DP field with the job of helping to set standards for professional conduct, training DPers and otherwise advancing the state of the art seems to have computer problems of its own.

An "unauthorized" computer apparently is working at the Data Processing Management Association (DPMA) — or at least that's the impression gained from a recent memo from executive director Edward J. Palmer to all chapter presidents, international directors and the Executive Council.

In Palmer's words: "Also enclosed is a corrected copy of the Jan. 31, 1977, International Membership Award (IMA) report. The earlier copy mailed to you with the February issue of 'News 'n Notes' was in error because of an unauthorized computer transposition of figures."

Either the computer is unauthorized, or DPMA regularly has it perform authorized transposition of figures.

Top Texas Court Reaffirms Ruling That Keypunch Services Not Taxable

AUSTIN, Texas — An appeals court decision that ruled keypunch services are not taxable in the case of Statistical Tabulating Corp. vs. Bullock was upheld here recently by the Texas Supreme Court.

While the Stat Tab case against the Texas State Tax Commissioner is often cited in discussions of the taxability of software, the ruling does not affect software nor does it apply to services other than keypunching in the state, sources said.

The statutes calling for sales taxes on keypunch services are being fought in several other states, including California, but at a lower level. Intellidata Corp. is seeking a change there through hearings with that state's Board of Equalization [CW, Oct. 18].

Motion for Rehearing

A motion for rehearing of the Stat Tah case has been filed by the state, but Don Nobles, the attorney representing Stat Tab, said that is a matter of form.

Nobles countered the state's argument that Stat Tab's keypunching constituted fabrication of tangible property by arguing the services merely provided an arrangement of holes in the cards, translating the data from human-readable to machine-readable form.

The court ruled the "element of service here is still the 'essence of the transaction.' "

The state had assessed Stat Tab $20,800 plus interest for services rendered since April 1974, Nobles said.

The suit was brought about four years ago. Stat Tab lost its trial, but won a verdict from the appeals court, which the Supreme Court upheld.

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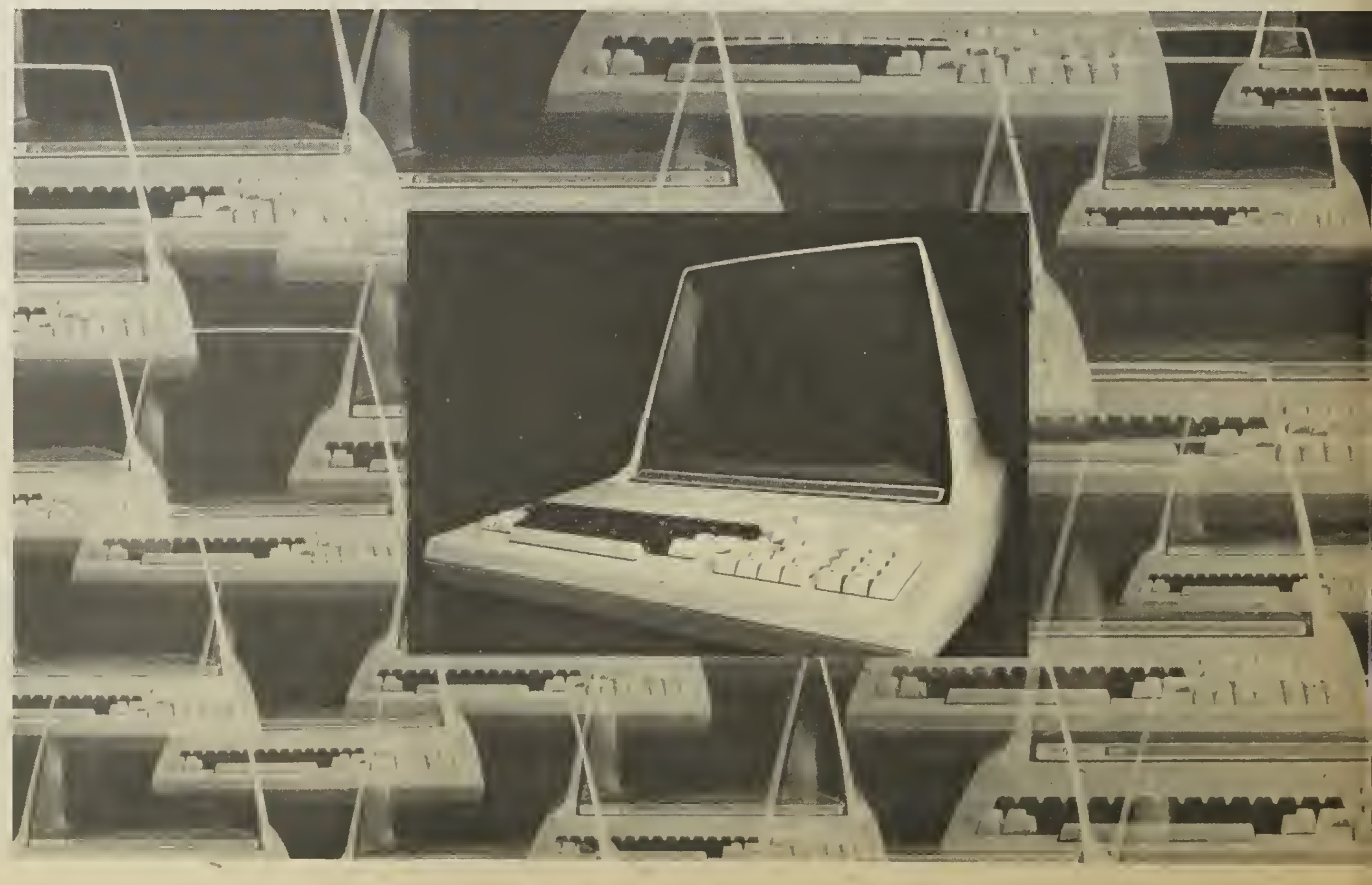


DP Groups' Codes of Ethics Abundant But Unenforced

By Molly Upton
Of the CW Staff

A *Computerworld* review of the codes of ethical conduct formulated by the major DP societies revealed an "abundance" of principles — none of which are enforced.

CW looked at the codes of four organizations: the Association for Computing Machinery (ACM), the Data Processing Management Association (DPMA), the Institute for Certification of Computer Professionals (ICCP) and the Association of Computer Programmers and Analysts (Acpa).

The ICCP, to which these other associations belong, has a code applicable to all holders of the Certificate of Data Processing (CDP).

In addition to commonly held tenets about upholding one's country, avoiding conflicts of interest and being law-abiding — the "motherhood and apple pie" principles — several codes of ethics address issues such as loyalty to one's employer, the confidentiality of data and the privacy of data.

Several also advocate explanation in laymen's terms of the capabilities and hazards of computers and forbid one to use jargon to impress others.

The ICCP code is the only one that specifically deals with the principle that people — not computers — are responsible for certain decisions: where "decisions can be made within a computer-based system which could adversely affect the personal security, work or career of an individual, the system design will specifically provide for decision review by a responsible executive who will thus remain accountable and identifiable for that decision."

The ICCP code also details a DPer's degree of accountability, which varies according to the position held and the type of work performed.

"A senior executive is accountable for the quality of work performed by all individuals he supervises and for ensuring that information recipients are fully aware of known limitations in the results provided," according to the ICCP.

"The personal accountability of consultants and technical experts is especially important because of the positions of unique trust inherent in their advisory roles. Consequently, they are accountable for seeing to it that known limitations of their work are fully disclosed, documented and explained," the ICCP code maintains.

Acpa's code states a member shall "accept full responsibility for his work and the consequences of computer-based systems developed by him or under his supervision."

The ACM code is more specific and details the DPer's responsibility to warn when the product is not adequate: "An ACM member shall not represent that a product of his work will perform its function adequately and will meet the receiver's operational needs when he knows or should know that the product is deficient."

An ACM member is also supposed to "express his professional opinion to his employers or clients regarding any adverse consequences to the public which might result from work proposed to him."

Confidentiality Provisions

Concerning confidentiality, the ICCP code expects a holder of the CDP will "not transmit information which he acquires during the practice of his profession in any situation which may harm or seriously affect a third party."

According to the ACM code, members shall not "use any confidential information from any employer or client, past or present, without prior permission."

The DPMA code includes forswearing the use of knowledge of a confidential nature pertaining to the business of a fellow member's employer to further one's personal interest.

Furthermore, DPMA members should "uphold the responsibility of trust, implicit with their professional status, by maintaining the confidentiality of data entrusted to their care" and "avoid using information of a confidential nature to further their own personal interests."

The Acpa code mentions employer loyalty specifically by requiring a member to "safeguard the security and integrity of all information considered confidential by his client or employer to which he may be privy by virtue of his profession."

The ICCP code warns "especially strong strictures will be applied to those who have used their position of trust to obtain information from computerized files for their personal gain."

Several codes advocated protection of privacy. The DPMA code calls for members to recognize their responsibility to "continuously strive to honor the rights to privacy of all individuals by using the information provided for their use only in the manner for which it was obtained and intended."

Furthermore, they should "attempt to remove any misleading or inaccurate data associated with any individual immediately upon learning that its current status is in error."

An Acpa member should "safeguard the privacy of all information relating to an identifiable individual to which he may be privy by virtue of his profession," according to that association's code.

Mt. Diablo Awaiting Verdict on IBM 370

By John P. Hebert
Of the CW Staff

CONCORD, Calif. — School officials here may have to return to IBM a computer system they allegedly ordered without authorization from the Board of Education or competitive bidding and paid for with funds earmarked for another purpose.

Taxpayers engaged in a class action suit against the Mt. Diablo Unified School District hope to recover the purchase price, maintenance and programming costs of the IBM 370/125 from the time of its January 1974 installation [CW, Feb. 21].

A decision on the case, which was heard in court earlier this month, is not expected for about six weeks.

Although the taxpayers are fighting the school district, IBM is a "real party in interest" in the suit. The San Francisco law firm of Pillsbury, Madison and Sutro, which represented IBM in the suit, has done most of the work not only for IBM, but also for the county counsel's office defending the school district, Stuart Safine, the plaintiffs' attorney, charged.

The taxpayers only want to recover the $660,000 paid to IBM since the system's installation; they have not brought the school officials to court on charges of fraud, although parts of the present suit rely on the concept of fraud to recover costs, Safine noted.

CPU Arrived Before RFP

During the trial in Superior Court here, it was learned that although the request for proposals (RFP) was issued in December 1973, an IBM 370/125 had already been ordered and arrived at a Brisbane, Calif., warehouse the previous September.

On Sept. 12, IBM salesman James Obendorf met with the school district's DP specialist, Charles Carlson, to "preinstall" the 370 — to make sure the system cabinets would fit and operate in the DP center which had housed an IBM 1401 system, both men testified.

In addition, it was learned the district had not performed any feasibility or evaluation studies for the IBM or any other system.

Carlson, who was queried on that point, testified there was no money to pay for such services. Other testimony revealed, however, that knowledgeable people had offered to perform the studies gratis, Safine said

In December 1973 the RFP was issued and was claimed to have prevented the competitive bidding by other vendors because Carlson allegedly had taken the system specifications directly from an IBM 370/125 specifications sheet.

Marketing representatives from Burroughs Corp., Computer Leasing Corp. and Univac told the court that, in their opinions, the RFP was restrictive, Safine said.

But Ned Chapin, a consultant with Infosci, Inc. and an expert witness assisting IBM's legal representatives, testified the RFP did not prevent competitive bidding and the bid specifications were not necessarily those of an IBM 370/125.

"It was apparent IBM bought Chapin" because he was paid $650 per day to assist the Pillsbury firm and $950 for the day he testified, Safine charged.

James Walsh, the lead Pillsbury attorney, countered Safine's accusation by saying Chapin is a consultant and there is "nothing unusual about [money paid to] an expert witness."

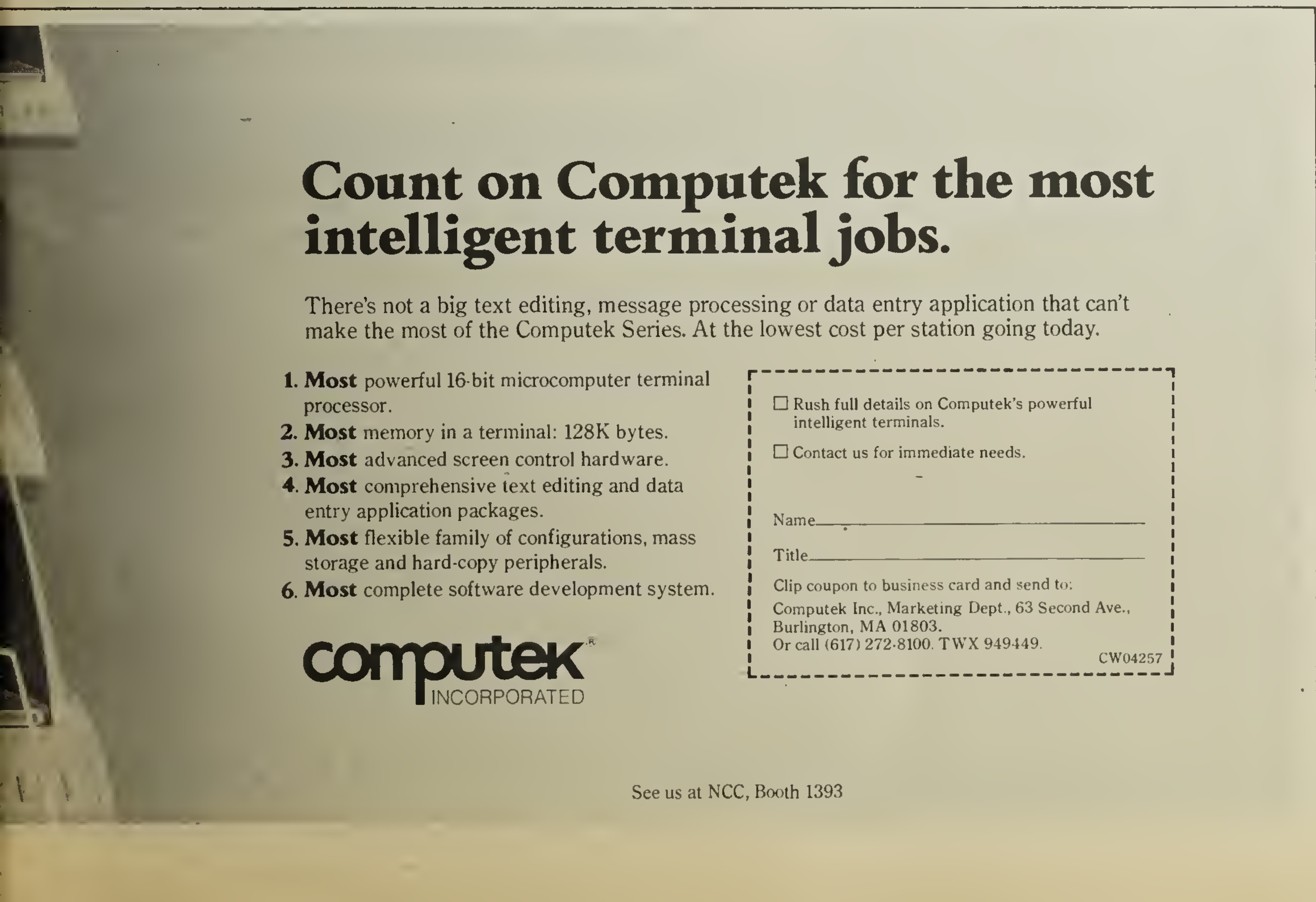
It was also learned during the trial that the school district's programmers attended IBM DP courses in nearby San Francisco at the time the RFP was issued in early December 1973.

Carlson testified he thought IBM was the only educator in the area, but testimony from others showed there were four or five other places near Concord that could have educated the programmers, Safine said.

Commenting on the importance of the school district's suit from IBM's viewpoint, an IBM spokesman indicated the plaintiff's remedy of making the computer system sale null and void is unfair and inappropriate.

On the question of 370/125 delivery schedules, the spokesman stated the same machine today would be delivered in eight months if a customer "did not request early delivery."

It could be made available "in less than four months" if the customer did make that request, he added.



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DP-Based Tree-Ring Study Reconstructs Past Climates

By Edith Holmes
Of the CW Staff

TUCSON, Ariz. — The frigid winter and drought that have stricken parts of the U.S. this year would not have surprised weather watchers if they had studied tree rings, according to scientists at the University of Arizona here.

Using ring widths and computers to reconstruct more than 300 years of climate in North America, Dr. Harold C. Fritts, who heads the group at the university's Laboratory of Tree-Ring Research, said analysis also indicates that the Northeast should expect cold winters like the past one to occur almost half of the time.

Fritts and Dr. Terence J. Blasing and G. Robert Lofgren, both meteorologists, are studying past climates by analyzing widths of annual tree rings from nearly 1,000 trees in western North America. Their research is funded by the National Science Foundation's Climate Dynamics Program.

Measures Climatic Factors

"The annual ring widths from the sample trees are measures of climatic factors as they have varied over all four seasons of the year," Fritts said.

"When many trees are sampled from a variety of sites over a wide geographic area, the ring widths contain a wealth of information on the environment that, in turn, is highly correlated with the regional climate," he explained.

With the help of a Control Data Corp. CDC 6400 and a Digital Equipment Corp. Decsystem 10, the scientists not only relate the ring widths to factors affecting the growth of the trees, but they also use the ring widths to reconstruct patterns of past climate over North America, Fritts continued.

The mainframes are programmed to compare climate to ring widths to provide a scale that is analogous to the markings on a thermometer or rain gauge, Fritts said.

This scale is then used to convert ring-width measurements into estimates of corresponding temperature or precipitation for years before climatic records were kept, he explained.

Reconstructed Variations

Fritts and his group have reconstructed climatic variations back to 1600 A.D. Ring widths throughout the Rocky Mountains and Colorado Plateau were generally narrower in the 17th, 18th and 19th centuries than those since 1900, he said.

This pattern of narrow rings is identified with winters that were dry in the West and cold in the North and East — much like this past winter, Fritts noted.

20th Century Winters

The scientists have also identified several general types of climatic patterns common to 20th century winters.

Two of the patterns with warm weather throughout the eastern U.S. were reconstructed 28% less frequently in the earlier centuries, while two patterns involving cold conditions either in the North or East appear to have occurred 21% more frequently then than they have in the last 77 years, Fritts said.

Based on their work using 300 years of reconstructed climate before 1900, the scientists have concluded that the average winter temperatures for the U.S. were significantly colder for much of the East and North and slightly warmer in the Southwest between 1600 and 1899 than during this century.

Past Key to Future

"If the past is the key to the future, and if we can use the climate reconstructed for 1601 to 1899 and recorded for 1900 to 1970 to estimate the normals to expect, then we should plan on 15 winters per century with cold in the East and Southeast and dry and mild weather in the Southwest," Fritts said.

"On top of this, we can expect approximately 32 additional winters per century to be colder than average throughout the north central and northeastern U.S.

"Therefore, statistically speaking, the calculations indicate cold winters of these two types can occur 47% of the time or almost one out of two years in the future," he added.

Fritts also maintained that 25 out of 100 years can be expected to be warmer than average in the East.

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Model Tracks Flow, Assimilation of Radioactive Waste

By Ann Dooley
Of the CW Staff

ORONO, Maine — The direction and assimilation of radioactive waste can now be predicted with a computer model that calculates the amount of trace elements in the waters surrounding a nuclear power plant.

The model was developed by University of Maine professors Charles Hess and Charles Smith after they studied the radioactive waste discharged from the Maine Yankee Atomic Power Plant at Montsweag Bay.

The model indicates the levels of radioactive discharge present so they can be compared with federally designated safety standards. The standards were set by the Nuclear Regulatory Commission to ensure discharges will not exceed human tolerance.

'Nuisance Factor'

The radioactive waste discharged from Maine Yankee consists of radionuclides made up of gamma rays and thermally heated water, Hess said. The radionuclides are in very small amounts and listed only as a "nuisance factor," he added.

"While the radionuclides are measured to be five times greater than fallout from the sky, the amount is still thousands of times lower than the maximum level set by the commission," Hess said.

In addition, Maine Yankee last year installed a diffuser which mixes the thermally heated discharge water with cold water at the bottom of the bay so temperatures will not be affected except by natural seasonal changes, he added.

Although there are no dangerous amounts of radioactive waste being discharged at Maine Yankee, a nuclear plant is required by law to find a discharge zone which is least likely to be affected by the discharge, Hess explained. "Instead of physically experimenting with every area, which entails arranging a new permit, the computer model can mathematically predict the most efficient and most minimally affected discharge zone," Hess said.

Areas not used for fishing or recreation or those near an outgoing tide flow would be the best suited to sustain any waste or hot water runoff, according to Smith.

The Maine Yankee Atomic Plant has no intentions of utilizing the information provided by the model at this time, however, because it is unfamiliar with the research and also feels government regulations on nuclear plant operations are sufficient, according to a spokesman.

Accurate Means of Testing

The computer model is constructed from data gathered when the mud flat is at low tide. A sediment sample is taken and studied for the distribution of the trace elements in the soil.

This is an accurate means of testing since the elements are relatively stationary for certain known periods of time, Hess said.

The tide flow as well as the physical features of the sediment are studied, Hess said. The data also includes tidal range, radioactive releases, time constants, depth of channels, the physical and active half-life of an element and how every factor varies over time.

Distribution Analysis

The data is entered into the university's IBM 370/148 here and analyzed according to distribution and buildup.

Results have shown there is no accumulation of radioactivity past one mile of the discharge point and waste does not build up over time but does vary seasonally, with summer being the most active period, Hess said.

The project, which can be applied to any nuclear plant, was sponsored by the National Sea Grant Program of the National Oceanic and Atmospheric Administration.

Booklet Covers Ideas On Home DP Ventures

DEERFIELD, Ill. — Datasearch, Inc. has published "The Shoestring, Start-at-Home Computer Business Handbook" covering 21 low-capital ventures.

The handbook covers consulting, programming, software packages, computer output microfilm, freelance distribution, temporary services, used computers, scrap components and computer products and services for the home.

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Editorials

Diminishing Options

The introduction of the System 34 by IBM [CW, April 18] provides another bit of information on how the company intends to distribute its operating software.

The System Support Program contains most of the operating system and is priced separately, but the System 34 is not truly an unbundled system since many functions reside in microcode in the CPU. This microcode is the key to the IBM approach.

It is significant that the operating system software which is available to the user is called a support program and not a system control program. The implication is that the separately priced software supports the microcoded instructions that IBM said are required to run the system.

The tasks performed by the microcoded instructions are basic to the operation of the system. They include I/O control, which probably will make it more difficult for users to attach non-IBM peripheral subsystems.

This might not be a problem in smaller systems like the 34, but it would be a limiting factor on larger mainframes.

The IBM pattern shown in the System 34 is to distribute operating software between separately priced operating systems and microcode. The exact mix will probably vary from system to system, making it difficult for users to find any commonality between systems.

The System 34 implies that users of tomorrow's systems will have less control over the operations of their CPUs. With some of the functions fixed — or at least preset — by the vendor, the potential for optimizing a system is restricted.

A Safe Alternative?

First-time users and large distributed processing users alike were given another alternative in the small system grab bag when IBM announced its System 34 recently.

The system parrots many others introduced within the last year with its multiprogramming, multiterminal capability and a price tag within the grasp of both the manager who needs a system that can communicate with his 370 or other small systems and the first-time user itching to get into the on-line real-time world.

So what makes it different?

The System 34 signals IBM's acknowledgement that distributed processing is indeed the way DP is headed. In addition, the system's capabilities reveal IBM was not unaware of the growing desire of first-time users to have a flexible multiterminal system with on-line capabilities.

And for those users who are considering what vendors are billing as distributed processing systems, it seems the 34 will impact their choices.

The system may provide operational advantages and the IBM umbrella to multiprogramming users who previously did not have this kind of system available from the mainframer.

So the question for both types of users to ponder is this: Will the System 34 represent a "safe" alternative or will its introduction actually cut the number of practical choices available?

When this question is answered, users may know the future of the small systems arena.

'So Your New Computer System Is Gonna Measure the Flow — How Much Extra for a Tourniquet?!'

Letters to the Editor

Virtual Record Systems: New Concept or Just New Name?

Alan Taylor's expansion on Richard Haasz's concept of "virtual records" ["Virtual Record Systems Make File Changes Practical," CW, April 11] caused this delayed reaction. It is amazing how those of us who sometimes think we're behind the times are reminded that, in computer development, there are many different "times."

The idea of expandable records has been working to an extreme in the library community for some years, in the form of Marc-II (machine-readable cataloging), a standard record format which consists of a variable number of variable-length fields, defined by directory entries.

The records can and do change dynamically and, in a typical application, can range in size from 170 char. to 7,200 char. Application programs deal with the portions of the record needed, working from the directory, and update systems rebuild as needed.

While a programmer's first encounter with Marc processing is likely to be a bit unnerving, the techniques become quite natural and matter-of-fact.

On the other side of the coin, there is a substantial trade-off to user-written space compression/decompression routines; they tend to make some system utilities unusable (sorts, for instance).

As I read the Taylor article, I couldn't help wondering: Are "virtual records" a new concept or just a new name?

Walter C. Crawford

Walnut Creek, Calif.

Setting Statements Straight

The article reporting results of an Auerbach Publishers, Inc. survey of minicomputer offerings ["Survey Finds Vendor's Hardware Support Varies," CW, April 4] contained one error and two misleading statements which I would like to set straight.

- "IBM is the only one of the vendors that will not offer maintenance education to users." We will provide education to owners and maintainers of IBM equipment.
- ". . . most of the vendors will not sell OEM-designated equipment." We will act as the purchasing agents for users and obtain complementary OEM equipment for them, but not competitive equipment, nor will we maintain this equipment.
- "[Hewlett-Packard Co.] will help users set up the installation assisting in such things as physical planning and facility preparation." IBM will provide physical planning assistance for the IBM elements of a system design and contract-letting for subcontractors preparing the non-IBM equipment and facilities.

William M. Shaffer
News Bureau Manager

IBM
Atlanta, Ga.

Salesmen Will Gain Recognition

We really enjoyed the editorial cartoon in the April 11 issue depicting the million dollar software salesman as an unknown revenue force in the marketplace.

As our industry grows, I am sure the software salesman will be recognized for his expertise in this highly technical arena, but for now, if the outside world thinks we sell socks and underwear, what it doesn't know won't hurt it.

We know software has become a multimillion dollar industry and the salesman in the marketplace is a pioneer who can be proud of his contribution to this new and exciting industry.

Harris A. Herman
President

Software Module Marketing
Sacramento, Calif.

Data Past

Five Years Ago
April 26, 1972

WASHINGTON, D.C. — The Justice Department gave "top priority" to the government's antitrust suit against IBM. It appeared likely the case would end up in court instead of in a consent decree, as two previous government antitrust actions against IBM did. The suit against IBM was brought by the Johnson Administration in January 1969.

— — —

BEDFORD, Mass.— Funds from the General Accounting Office (GAO) allowed the National Academy of Science to start a study which could lead to information science standards for the federal government, according to Edward J. Mahoney, deputy director of GAO's Financial and General Management Studies Division.

Eight Years Ago
April 30, 1969

PRINCETON, N.J. — Continuing its policy of regarding programs as equivalent to hardware, Applied Data Research, Inc. (ADR) filed antitrust suits against IBM totaling over $903 million in damages for ADR and at least $3.5 billion to be set aside by IBM for rebates to their other users.

— — —

NEW YORK — Members of the Association for Computing Machinery (ACM) were told of the association's financial crisis by Bernard A. Galler, president. Writing in *ACM Communications,* Galler urged drastic action to effect the very large change in projected income and expenses of the association.

Can DPer's Successfully Solve Romance Problems?

By Jack Stone
Special to Computerworld

"Amor omnia vincit!" — Love conquers all! — so the expression goes. But can our wondrous analysts and programmers, who have so aptly demonstrated their abilities to develop intergalactic computerized/communications/control systems, apply their talents toward successful solutions of the most ancient of human problems: the search for romance and affection?

Last week's column discussed worldwide reservation systems which help a Washington, D.C., hotel to provide straightforward answers to one set of human needs — namely, a home away from home.

Ironically, only a few blocks away from the hotel, two women are applying electronic technology to help people find soul (or other) mates.

I found these very fascinating people as I was exploring the general subject of computerized dating services. Their approach was so interesting that I found myself wanting to become intimately involved.

For this purpose, I interviewed Joan Hendrikson and Susan Galloway, coowners and senior love counselors of Videodate of Georgetown, Inc., who provide private introduction, social counseling and group socialization services.

Q: For starters, can you briefly describe what senior love counselors do?

Joan: Our primary task is to arrange for single people to meet each other on a private and professional basis. After a successful introduction or "match," we help our clients perpetuate their relationships through our advice and assistance, as well as through mature social gatherings.

Q: Is the introduction process a complicated one?

Joan: It's really quite simple. First, one of us interviews a client for about a half hour, talking about his or her hobbies and interests, what makes him happy or what she seeks in a relationship.

During the course of the conversation, we make a brief videotape recording of the client when he or she talks about those qualities which attract them to a future partner.

By locating our offices in a Georgetown townhouse, using a livingroom setting and focusing our total attention on the client during the interview period, we achieve tapings which are unusually relaxed and natural.

Neither the taping nor related biographical documentation, termed "profile," contain identification data except for the first name.

Q: And the next step?

Susan: We present new profiles to other clients when they come in for their regular monthly appointments. After initial screenings, clients may view taped appearances of potential partners and notify us of their selections.

When the selectees come in, they preview the profiles and tapes of the selectors.

If a mutual selection occurs, the love counselor provides names and phone numbers to the clients involved, a match is made and off they go.

Q: Precisely, what experiences have you two had that qualify you as expert love counselors? Joan, you first.

Joan: Well, frankly, I have had the good fortune to have been involved with many successful relationships, both in my personal and professional life.

Based on these friendships, I feel that I can make a contribution by helping single men and women get together on a private basis, rather than have them suffer the degrading and dehumanizing pressures of the "singles bars."

Q: And Susan?

Susan: Since I received my undergraduate degree in psychology, I have always worked directly with people in various social service capacities.

However, I found social work, as such, difficult to deal with because I became personally involved with the problems of patients.

The Human Connection

But, helping people to meet new friends and form new relationships, with the ultimate prospect, perhaps, of marriage, stimulates me greatly. I feel that my involvement in this service is all positive and creative and I am sincerely thrilled when a match occurs.

Q: So yours is not a "computer-dating" service.

Susan: Oh, no, no, no! What does a computer programmer know about the chemistry of love?

Joan: That's right!

Susan: You see, our clients report to us that dating services dependent on computer processing alone attempt to parameterize the emotional relationships between humans in terms of, perhaps, 20 or 30 variables.

All humans know, possibly excluding programmers, that there is an infinity of conscious, subconscious and varying factors that influence the selection of a partner.

Joan: The videotape reveals many human characteristics and traits which are obviously nonprogrammable, but have real meaning to a selector. They include personality, attitude, body "language," voice structure and, frankly, sex appeal.

We have actually had some clients fall in love with a video image.

Q: At the risk of appearing downright mechanistic, is there possibly some modest but valid area where computer technology can aid the mating game?

Susan: Well, we have been looking at the possibility of a small system to provide preediting assistance to clients because our client base is growing so rapidly.

Joan: We are checking into the hand-held portable calculator, which is card programmable. We are thinking about storing certain general client characteristics on these small cards in a master data base ZX.

At this point in the development of this business, we feel any larger device would leave the impression a machine is making selections instead of the client.

Susan: We are now starting to look for a general-purpose data base management system for the calculator. Do you know of any packaged software for this purpose, preferably priced under $100 for one-time charge?

Stone: No, I don't. I think that you are really pushing the state of the art of computers (and others). But, since, in my heyday, I have been known to program up a storm or two, would you consider a joint development project in which I will provide custom services and you provide a beta test site plus a lifetime membership for me as a Videodater?

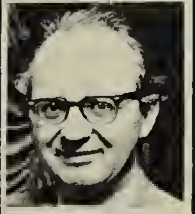
AICPA Testing Guidelines Seen in Need of Clarification

The American Institute of Certified Public Accountants (AICPA) recently came out with its own set of guidelines for development of computer applications.

It is quite a good effort and seems to be particularly useful in explaining to non-DPers the need for constant testing and retesting without going off into too much specialized jargon.

The Taylor Report

By
Alan Taylor, CDP



In fact, so far as the testing group is concerned, it gives about the best list of the where, when and what of tests (other than program tests) that I have seen, using some of the 87 tasks either wholly or partly in testing matters.

Testing in the AICPA's view, starts in Phase 4 — after Requirements Definition and Alternative Approaches, General Systems Design and Detail Systems Design. Phase 4 is called Program Specifications and Implementation Planning and will later be followed by Phase 5 — Programming and Testing; Phase 6 — Systems Testing; Phase 7 — Conversion and Volume (or Final) Testing; and Phase 8 — Implementation.

Phase 4 starts with Task 46, which is preparation of the test plans. The AICPA recommends a worksheet for this, giving the testing philosophy, objectives, procedures, constraints, personnel responsibilities and success criteria for each of three test groupings — program, system and volume testing.

I don't quite follow here, perhaps because what I think of as a worksheet may not be what accountants think of.

I like the idea of having the various subjects that must be addressed included in each of the three test plans, but I certainly could not reduce the testing philosophy of the volume test into any sort of a worksheet form.

Another criticism of Task 46 that seems valid is that it simply doesn't get to the user. All the various testing philosophy in the world being put down on paper is no good unless it gets scrutinized by others who may not have the same philosophy.

Just documenting one testing philosophy doesn't really do either. What is important is listing the various testing philosophies that have been considered, why those that were rejected were rejected, by whom and after what consideration.

In addition, consideration of the disadvantages of the one that is accepted has to be brought out cleanly and vigorously before any real "acceptance" of the philosophy takes place.

The use of a worksheet simply can't do the job that is needed here.

The rest of Phase 4 is concerned with getting printed forms, developing manual outlines, training programmers and preparing detailed program specifications.

Real testing starts in Phase 5, after the programs have been compiled. Program test procedures are developed in two groups — Unit Programs and Integration or String Tests.

Program test data is prepared and the expected results on the worksheet and tests are documented and reviewed with users "to obtain acceptance."

Again, there is no facility for the user to provide any tests himself and no requirement of boundary condition tests, editing tests, handling of incorrect input tests or any of the sophistication that should exist in the computer industry by now.

Systems testing is handled in Phase 6, more adequately than program testing was handled in Phase 5. Test files are created with specific standards for accuracy — unstated standards, but at least they are mentioned.

People are told to maintain the test files, making testing a continuous operation and not just a one-time event — another improvement over the program testing operations. Even users are brought into the picture, in the very first task of preparing procedures.

The difference between the two approaches of preparing for program tests and systems tests is like chalk and cheese, with the system test operations being as up to date as you can expect any organization like the AICPA to be.

The improvement in the setting up of the tests carries down through the institute's evaluation also. Test results this time are analyzed independently of the programmers assigned to the projects.

Unfortunately, there is no mention as to how the analysts are to get themselves trained into being able to really analyze someone else's project.

Nor is there mention of whether the analysis is to be based on "documentation" of the tests, with the analyst really only being prevented from "clearing" a mistake by claiming that he had made some earlier mistake in the preparation of the test master files or expected results.

It really doesn't constitute a full test yet, but it is as good as we are likely to be able to get.

Even the possibility of test failures is brought out in this section — for the first time. The user is brought into the operation and, in Task 64, retests and review are called for.

Phase 7 calls for volume tests to ensure the system is functioning in accordance with the requirements and design specifications. However, no expansion as to what this really entails is given.

Apparently, all that is really happening is that the system is to be tested in an initial-level "live implementation," with files, input, configuration and inquiry levels only at the initial use level.

Live vs. Spec Tests

In my experience, testing in an initial live level is a far cry from testing to specifications.

Programs are often intended to have uses developed over years and still to be able to hit specified response times and not to generate over a certain amount of overhead. Files are supposed to be updated constantly and to maintain some history.

The number of things missing from this description of volume tests indicates that either the specifications are very poorly worded or the installation has so much money to spare that it doesn't care about keeping a reasonable pruning of its budget.

Neither side is normal nor are they to be encouraged.

With volume tests, the testing procedures are ended. Hopefully, their extension from Task 46 through Task 74 will have convinced people to take them seriously. But one thing is never really considered: What happens when something fairly fundamental goes wrong, such as a cost overrun, a capacity underrun or a time failure?

The more the testing budget is, the more the temptation will be to cut short the testing operation in order to make the delivery date. In fact, the delivery date deadlines (as well as budget deadlines) are all set in Task 3 — 44 tasks before testing is even mentioned.

This is simply no good. Before testing is started, or even planned, how can anyone lay down an "absolute timing requirement" in a memo, as called for by Task 3? If there are any such requirements, aren't statements as to whether they are to be met an output of every testing operation?

Are we not missing a necessary interrelationship here? Or are we telling the testers "this far shall you test, but then give us a clean bill of health"?

That is what I see happening here, under all the details. Factually, we still are not developing and testing programs and systems according to schedule or specifications.

That being so, the testing procedures should admit the possibility of even "absolute" timing requirements going down the drain.

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Copyright Act Protects Program's Form, Not Contents

By Roy N. Freed

Special to Computerworld

From a Legal Viewpoint

Persons who claim proprietary rights in software programs must be alert to the impact of the new Federal Copyright Act that takes full effect on Jan. 1, 1978. That law makes a number of major departures from the law in effect since 1909. Even before it is applicable, it is raising many questions, especially about its coverage of software programs.

As readers will recall, the Copyright Office responded to the interest of software program owners in securing statutory copyrights by agreeing to accept computer media for copyright registration as long as it is accompanied by humanly readable code. There always has been a question whether that is valid, no court having ruled on it directly.

The new law does not clearly either apply or exclude software program media. Its Section 117 fudges largely as a holding action in case any amendments are sparked by forthcoming reports of the National Commission on New Technical Uses of Copyrighted Works (Contu).

Section 117 stipulates the law "does not afford to the owner of copyright in a work any greater or lesser rights with respect to the use of the work in conjunction with automatic systems . . . than those afforded to works under the law . . . in effect on Dec. 31, 1977.

The Copyright Office's legal counsel believes that provision applies only to computer use of data bases. Because of the generality of the language, such as the words "in conjunction with," lawyers are contending it includes software program material as well.

As might be expected, Contu seems to be oriented to copyright protection for software program materials rather than patents or trade secret measures. That will give a boost to that approach, especially to people in the industry who lack sophistication about the scope of copyright protection.

It is essential to recognize that a copyright covers only the physical form of the copyrighted work, not its contents. The information in it is available to the world for free use, unless covered by an effective patent.

The copyright owner simply may prevent others from making copies of the copyrighted work without permission — if the owner can detect infringements — and take legal action to prove infringement and enforce his rights.

There will continue to be a very respectable group of knowledgeable people who believe trade secret protection is superior to copyrighting. They stress the disclosure of the code, which is implicit in "publication," gives unnecessarily wide distribution to software program materials.

They also recognize copyrighting is a publisher's protection under which the owner's return is based on the quantities of copies made, whereas software program use is not related to quantities of copies of computer media involved.

Automatic Protection

The structure of the new law introduces some confusion because, for the first time in this country, it automatically gives copyright protection as works are created. It also replaces common law copyright.

As a result, statutory copyright would attach to computer media without any action on the part of the owner of the software program.

It is extremely important to recognize the owner does not have to rely on statutory copyright protection for published works. The owner may use the trade secret approach simply by avoiding action that would constitute "publication" of the computer media and other material that reflects the software program.

To that end, the owner would distribute those materials under restrictions against copying, disclosure and transfer without authorization. That is the regular trade secret method. It also represents reliance on the new statutory copyright on unpublished works.

To achieve the recommended trade secret protection, it is more important than ever for software program suppliers to use carefully worded agreement forms. By carelessness, they will give up their automatic copyright protection and not get the benefit of trade secret law.

The forms should grant licenses to customers to practice information-processing processes and should identify computer media and documentation as items that reveal the nature of the processes, similar to manuals for industrial processes carried out by people.

This message has been offered in these columns before. It is more important than ever in view of the radical law change.

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Based On Erroneous Assumptions

DP Employers Hiding Behind Prejudice-Laced Cliches

By John Callahan
Special to Computerworld

A woman senior analyst/programmer recently wrote to *Computerworld* about a prejudice barrier in hiring that revolves around lack of a college degree [CW, March 7]. She indicated she had been in DP for 20 years, was evidently in the midst of a job search and was having a rough time of trying to get interviews leading to a job offer.

I would like to suggest to her and to others who might be interested that the "no college degree" argument is an easy front behind which to hide.

Here are some such hiring cliches and a most probable interpretation of them from the employer standpoint.

- *Cliche*: "You don't have a college degree."
- *Meaning*: It is assumed the person without a degree does not have the same level of intelligence as the degree holder and hence is not as well suited to solve and work with sophisticated problems.

With so many college graduates in the market seeking jobs, why bother to consider hiring any but those with college degrees, when by seeking only the college graduates the capability level of DP staff can be upgraded considerably?

- *Cliche*: "You have been unemployed for more than six months."
- *Meaning*: It is assumed the person who has been out in the market for a lengthy time period must be deadwood or an incompetent. Everyone knows "a top man can always find a good job" and "a top man is always a sought-after person."

It is also assumed the person who has not taken whatever work is at hand in DP, however distasteful such work might be (e.g., an analyst taking a programmer's job or an operator's job if that is all that is available) must be deficient in desirable personal characteristics such as drive, flexibility, versatility, industriousness, enthusiasm, ingenuity, perception, etc. There is a host of character failure assumptions which can be generalized.

- *Cliche*: "You are over 40 years old."
- *Meaning*: It is assumed persons in this category have become outdated in their knowledge and application techniques; their perceptions and productive capacities have waned; their drive, enthusiasm and ability to keep on top of problems has diminished; their dependability on the job has become questionable; and they are higher costs in terms of pension and insurance plans.

Therefore, it is not in the interest of the company to consider people such as these who obviously represent more of a liability than an asset.

'Too Many Jobs'

- *Cliche*: "You've changed jobs too many times."
- *Meaning*: It is assumed employees are fired or laid off because they are incompetent or deadwood whom prior companies were eager to cast off.

Everyone knows that companies always take care of their good men and do everything possible to keep them on the payroll. Therefore, a person who has a record of job changes is automatically suspect. There must be something amiss with such persons, otherwise their prior companies would have kept them, wouldn't they?

- *Cliche*: "Your background doesn't fit the job requirements closely enough. Other applicants have a closer match."
- *Meaning*: It is assumed it takes a monetary investment to train a person with a sound knowledge of basic principles in specific problem application areas. It is far easier and more immediately productive to hire a man who is already a specialist in the JBD Personnel Skills System, Mod. 3, Version 2.5.9.

Reader Commentary

But once this project is implemented, the employer won't have any further need for this application specialist, because it would have to invest more training dollars in new problem application areas; therefore, he is to be dismissed.

- *Cliche*: "Your salary progress does not show a pattern of upgrade successes."
- *Meaning*: It is assumed the person on the rise, the very competent go-getter, moves from one job level to a higher job level with more responsibility and a fatter paycheck. If such a move would not be an advance, the competent person would not make it.

Of course, everyone knows competent persons do not have their career advances interrupted by abrupt changes in company plans which throw people out into the market to try to find jobs while being in the ranks of the unemployed. Competent persons always move from one position of employment to another position of employment.

- *Cliche*: "We need someone who can be immediately productive."
- *Meaning*: It is assumed maximum production and minimum expenditures for training can be gained by hiring specialists as projects arise. Companies bring these specialists in to do the job and then, when the job is completed, fire them and hire other specialists as other projects arise.

It would take training dollars to hire generalists who have a sound grasp of and experience in the intelligent application of system principles, and besides the company would have to do effective advance planning to keep these generalists busy and develop career paths for them.

Cyclical patterns of hiring and firing specialists don't require development of strengths in managerial professionalism among DP personnel.

Is it possible these hiring cliches — so deeply entrenched and widely followed as the basis for applicant selection, interview invitations and hiring decisions — are heavily contributing to the very poor personnel conditions which exist in DP departments throughout most of U.S. industry?

And is it possible these cliches also are heavily contributing to the poor performance of most DP shops?

If the answer is yes, then how are such conditions ever to be corrected until and unless authorized personnel begin to analyze these cliches closely and learn they are loaded with erroneous assumptions and based on superficial appearances and biased and fallacious beliefs, all of which lead to erroneous conclusions.

If CW's readers have encountered other kinds of cliche obstructionist barriers to finding the right employment, it would be interesting to hear from them.

Callahan, a Saratoga, N.Y., systems analyst with 18 years' experience in DP, is looking for a job.

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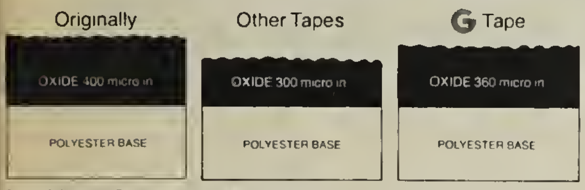

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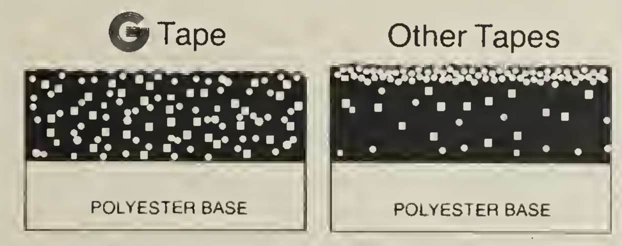

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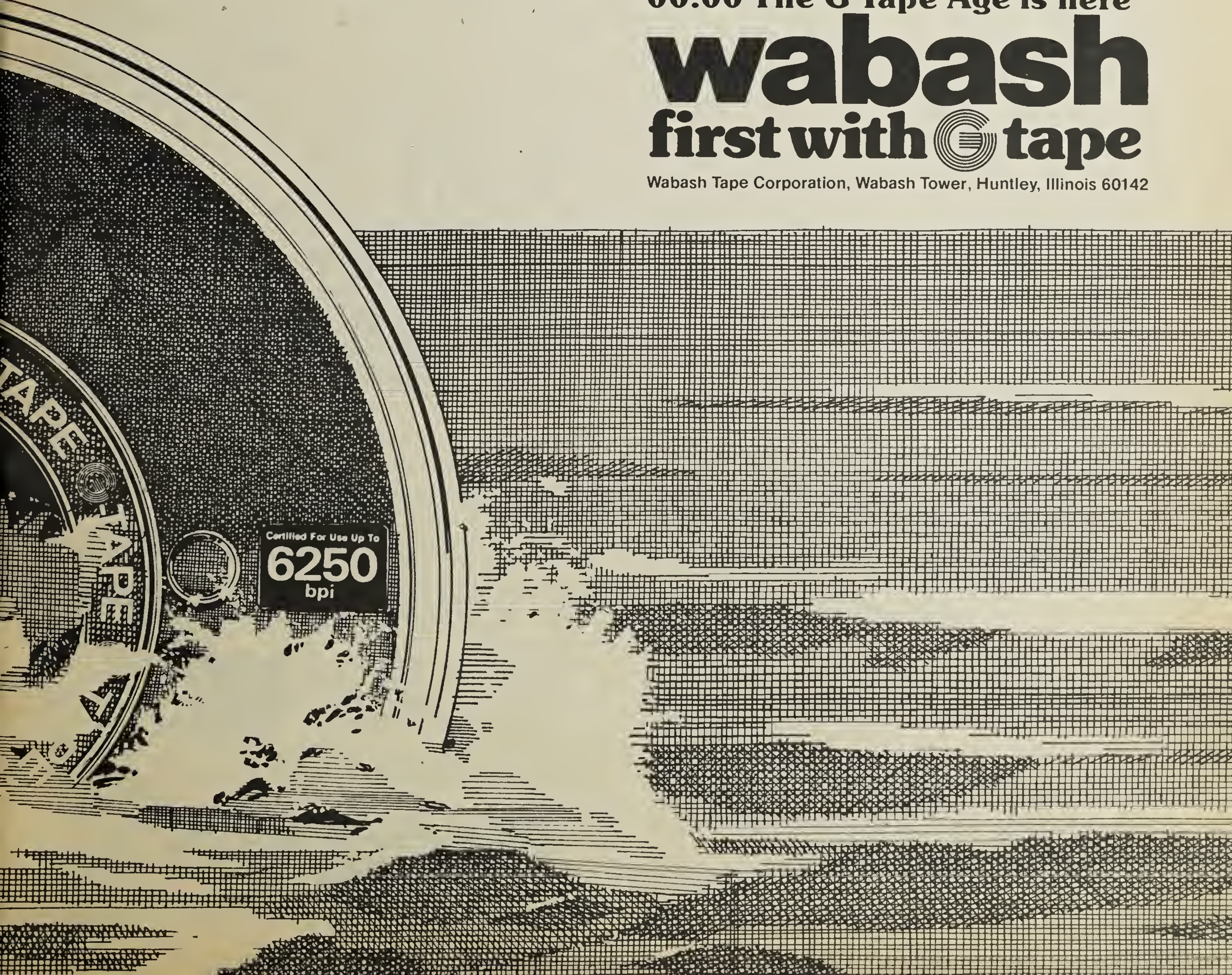
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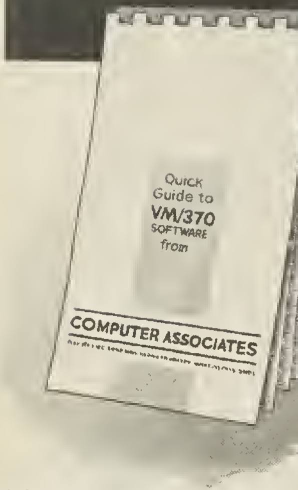

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Future Scenarios Not Comforting

'Data Ownership' Needs New Distinction

By D.D. Pearson
Special to Computerworld

Reader Commentary

In recent issues of this and other publications, there have been a number of letters and articles dealing with the issue of ownership of data in credit and other files.

I recently had a personal example of the availability of bank data. I walked into a bank in which I had never been before and told the receptionist my father-in-law (now deceased) had had an account there.

As executor of his estate, I said, I needed proof for the Internal Revenue Service (IRS) that the account had been closed prior to his death, since it had not been listed in Schedule C of the estate's 706 return (similar to an individual's 1040).

The young lady, having been given a slip of paper with the name and number of the account, went off and got the record cards.

When I requested it (upon consultation with an officer of the bank), she typed a letter to me stating when the account had been opened, the amount in it, exact title of the account and when it had been closed.

She then took the letter to the officer, who signed it. The letter was then given to me. I never spoke to the officer.

This whole episode amazed me — it was very convenient for me as executor of the estate. But it would have been just as convenient if I had been from the IRS or the Central Intelligence Agency.

Suppose I'm somebody who is about to sue you. If this had been your account, would you like this kind of access?

In the future, and I don't mean the distant future (in fact, around the corner through the use of credit, bank cards, point-of-sale terminals and electronic funds transfer systems) there will be all kinds of records in all kinds of files about all of us, in every conceivable combination — as individuals, families, social groups, etc.

A Situation to Consider

Consider this situation. A supermarket chain, through its point-of-sale terminals and electronic funds transfer (EFT) bank numbers, without charge to the consumer, builds up a history on tape or disk of a consumer's use of staple items (such as paper towels, sugar or laundry detergent). Then, based on this data, the chain offers the individual household an automatic reorder system, as the heating oil companies do now.

Take it one step further. Imagine meats coded by type, cut, weight and price. Extend this idea over the weeks and years.

Just before the weekly purchase day, the following arrives at the consumer's home:

Dear Mrs. X,

Based on your computer profile of past purchases, we are sure that you will like the following bargain that we have arranged for you this week:

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Sincerely,
XYZ Supermarket

Since meat is a significant part of the American food budget, who compares "profile" with "bargain" . . . with budget?

Ownership Questions

In a current legal sense, I must agree the "property" is that of the party forming the opinion of the creditworthiness of the applicant and also the property of the party who bears the expense of creating and maintaining the record.

Perhaps there should be a new distinction between the ownership of the "record" and the numbers contained in the record. (The "record" is boxes of bytes; the numbers are digits of data within the boxes that apply to the individual.) These "numbers" must be owned by the specific individual.

In the above example, does the supermarket own the record, or does the individual household own the contents? What if the household wishes to take its business elsewhere? Can it take its data with it? In what form? A copy or the "original"? At what cost? Who is to see to this?

Can this data be sold by the supermarket?

What if the customer authorizes the "Best Buy," based on the supermarket flyer, and the supermarket (with prior agreement of a number of wholesalers) alternates from one wholesaler to another to "arrange" such a "best buy"?

Obviously, the Federal Trade Commission would get involved at some point. However, I believe the computer industry and all professionals in the field must become involved in determining both costs and controls.

There needs to be legislation to define the legal extents, but we must take a very active part, or . . . ?

Pearson is a retail industry consultant in New York City.

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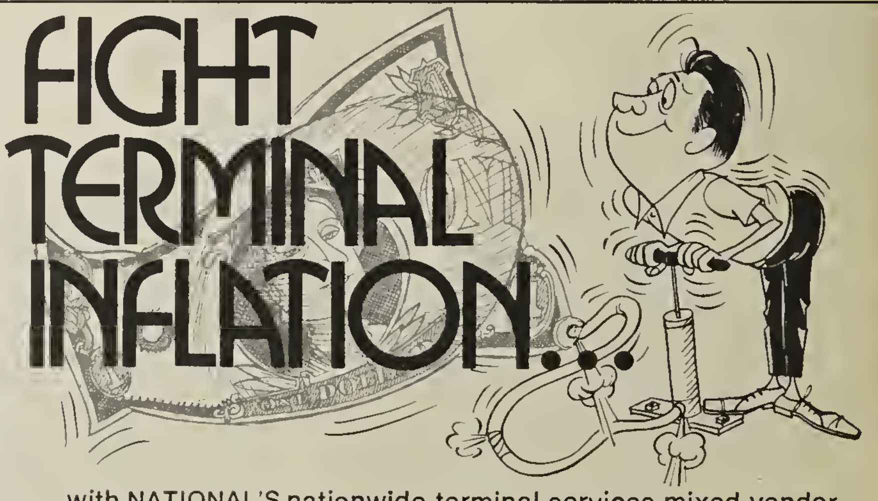

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IBM Adds Software to 'Barebones' Series/1

By Esther Surden
Of the CW Staff

ATLANTA — Along with its introduction of the System 34, IBM announced several software enhancements to increase the sophistication of its "barebones" Series/1 minicomputer.

The software announcements were not entirely unexpected. Since the introduction of the Series/1, designed for sophisticated end users and OEMs, speculation had mounted as to when a real-time operating system and higher level programming languages would be available.

Announced were Fortran and PL/I, a program preparation subsystem and a real-time operating system.

The Real-Time Programming System is an operating system for building user-created applications; it consists of supervisor services, data management, communications and utilities, IBM said.

The disk-based operating system allows multiprogramming in one or more fixed partitions, multiple concurrent operations and execution of multiple tasks and programs based on external events, time or operator or program requests. It will be available in October for a one-time charge of $1,200 or a monthly license fee of $20.

The program preparation subsystem reportedly allows users to develop applications programs concurrently with real-time program execution. It includes a jobstream processor, text editor, macro assembler and an application builder that run under control of the Real-Time Programming System. The subsystem will also be available in October; it costs $1,104 or can be licensed for $18/mo.

The PL/I introduced for the system was designed for programming in real-time, scientific or commercial applications. The language adheres to Ansi PL/I with real-time language extensions, IBM noted.

The compiler operates under the real-time operating system and costs $2,784. Monthly licensing costs $45.

The PL/I transient library is available for $288 or a license fee of $5/mo. Both the compiler and the library will be available in April 1978.

For users who need to manipulate numerical data and formatted input/output operations, IBM announced support of Fortran IV for the Series/1. It provides support for real-time sensor-based scientific and engineering applications and operates under both the real-time operating system and program preparation subsystem.

The Fortran IV compiler and object library, which will be available in October, cost $864 or $14/mo. The Fortran IV real-time subroutine library, needed for execution of real-time programs, costs $288 or $5/mo.

A mathematical and functional subroutine library with mathematical, conversion and error-checking routines for applications programming will be available in October for $408 or $7/mo, IBM said.

IBM also enhanced its control program support to include "added resource management of I/O equipment and an index access method." The six modules, available in July, cost $1.50- to $6/mo each; license fees will be waived after 24 consecutive payments, IBM noted.

In Cooperative Environment

Communications Keep Near-Saturated System Working

By Don Leavitt
Of the CW Staff

NEW ORLEANS — By working closely with both users and vendors, the staff of a full-scale DP center here has been able to function well even though its current system is nearing saturation. The same cooperative attitude is enabling it to plan well for the CPU upgrade that now seems inevitable.

J. Ray McDermott & Co., Inc. is an international firm that designs, fabricates and installs oil field platforms and piping systems. Its domestic DP operations are based on a 2M-byte IBM 370/158 with 3330 and 3350 disk subsystems and 6,250 bit/in. 3420-8 tape drives.

In addition to batch work, the OS/VS2-driven system supports nine users on a remote job entry network under Hasp 4 and 75 terminals running under CICS or TSO, according to Louis A. Sandoz, manager of computer systems and operations.

Certainly those teleprocessing facilities are among the communications that make the current system effective, he said, adding that TSO support, in place for about two years, "has grown phenomenally" in both interest and benefit to the company.

"We've had very positive response from all types of people, including people out in the shipyards," he continued. The programmers have taken to interactive program development very happily, he said.

Engineers have utilized the system, too, and some of their massive studies, combined with the company's normal workload, have come close at times to exhausting almost all available virtual storage, Sandoz noted.

The company developed a weekly report on operating statistics and open problems. This is distributed widely so all concerned know how things are going. With the open problem listing, Sandoz said, users also realize the staff is aware of shortcomings.

Those same weekly reports have affected the level of support McDermott has been getting from IBM. "The customer set dictates the branch office response," he said. If the customer doesn't seem to know or care what the problem is, there's no real incentive for the vendor to put a lot of effort into its response, he explained.

Log Uncovers Patterns

For their part, the system operators have been using an "incident report" log at the console to note anything that seems like an abnormality. They note all the basic, obvious information and are encouraged to add anything else that occurs to them in connection with whatever the incident is, Sandoz said.

In that way, without a lot of effort they capture information that may seem insignificant by itself but which may begin to show up as a pattern suggesting a solution if repeated several times.

Sandoz's staff has even extracted communications from the operating system, in the form of SMF data, and the message from that source is that better data space management is needed. Sandoz expects to take a "gross cut" at this problem by gradually moving the less active data sets from disk to tape.

The Human Connection

IBM isn't the only vendor that has begun working with McDermott partially on the basis of the weekly open problem reports and the incident log. The telephone company has also recognized the value of what this user is doing in connection with its own troubleshooting, Sandoz added.

He noted, almost incidentally, that McDermott is certainly open to innovations from IBM. "The move to 3350s has saved us $1,700/mo even though we've only replaced half the 3330s," he said.

But the biggest form of communication the company has had with any vendors recently has been in connection with the benchmarking of candidate CPUs to replace the 158. The final "contestants" are the Amdahl 470V/6 and the IBM 370/168-3.

That process was "interesting at times, frustrating most of the time," Sandoz said, adding a final decision can be expected shortly since the company is pointing to installation sometime in early autumn.

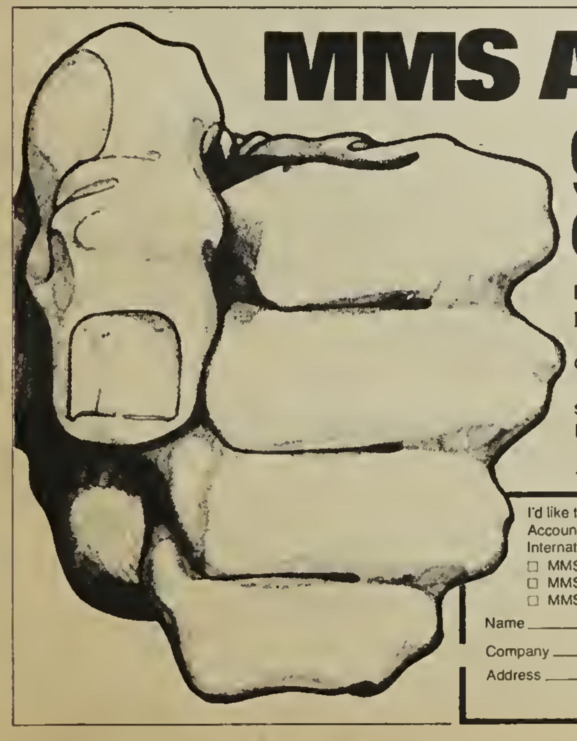
McDermott provided a real jobstream to the vendors for each of three basic workload patterns: teleprocessing only, batch only and mixed. Sandoz and his crew got into some discussions with IBM people in Gaithersburg, Md., and with Amdahl people in California.

The IBM people "went to their gurus to devise a better test pattern, but they couldn't do any better than we did." McDermott resisted all efforts by the vendors to modify the workload, obviously to take advantage of some capability of their CPUs.

"If we had allowed that to happen," Sandoz explained, "we would end up benchmarking the benchmarking teams and not the CPUs. We would also have lost the baseline we had — the timings of that jobstream on our 158."

What of the future? Since both machines now being considered as upgrades use the same software, McDermott is looking at the MVS versions of OS/VS2.

With the current workload sometimes exceeding virtual storage capacity, some interference occurring between time-sharing and batch and a growing number of IPLs, Sandoz knows he has to do something.



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Fortran 77 Tops GE Net Enhancements

ROCKVILLE, Md. — Three products and a pair of service enhancements now available on the General Electric (GE) Mark III remote-computing network are said to provide such an improvement of support that GE refers to their capabilities as Mark III Plus.

The products are Fortran 77, which is said to meet all and to exceed many of the newly proposed American National Standard Fortran specifications; DMS II, an enhanced data base management system and report generation system; and Jobs, a master scheduler of large, production-oriented software systems.

The service enhancements are a low-cost data entry facility called Data Entry Mode and an annual program maintenance service plan, GE said.

Fortran 77 offers structured programming constructions, streamlined data base interfaces, a unique interrupt-handling capability and "other time- and cost-saving options," a spokesman claimed.

French and German, Too

The ability of DMS II to accept report initiation instructions in French and German as well as English is said to be unique. "Extensive" formatting and tabulating controls have been designed so even computer novices can use the system effectively with a full range of file types, GE said.

DMS II interfaces with Fortran 77 programs as well as with other GE plotting and financial analysis software.

In addition to scheduling large projects, Jobs is said to automate procedures and use a "modular, standardized" approach that can conserve administrative time and costs. Jobs was described as suitable for any large management application, "in particular those spanning several time zones." No other vendor offers as comprehensive a scheduling system, GE claimed.

Of the service offerings, Data Entry Mode is said to be designed for applications requiring long periods of on-line data input. It permits that function to be handled at "considerably less" cost than was previously possible with GE's other communications choices, the spokesman said.

The annual program maintenance service provides for a fixed level of on-call programming support for the maintenance and enhancement of customer programs developed by GE's Custom Application Operation. It is available on an annual contract basis, the spokesman added from GE network headquarters, 401 N. Washington, Rockville, Md. 20850.

Cybernet Service Aids Engineer

MINNEAPOLIS — The Universal Structural Analysis (Unistruc) service now available on Control Data Corp.'s Cybernet time-sharing network may save as much as 75% of industrial engineering users' time, according to a CDC spokesman.

Unistruc integrates computer-based structural analysis techniques with computer graphics to provide such advantages for users, the spokesman said.

Normally about 90% of the time and cost of industrial structural analysis is consumed in preparing information for the computer and in analyzing results, he explained. With Unistruc, the user gains an integrated approach to model creation in the first place and the analysis activities at the other end of the process, he claimed.

From a CRT terminal connected to the Cybernet system, an engineer can create a design model. As the picture is being generated on his screen, the system creates a data base which can be processed on a "wide range" of finite-element structural analysis programs, he said.

Results Shown

From the terminal keyboard, the engineer can call on the computer to execute appropriate programs; the results are displayed on the screen alongside the design model. The model can be modified or more programs executed until the engineer has tested all alternatives required to meet the design objectives, CDC said.

The service is expected to find application in such industries as nuclear power engineering, civil engineering and architecture, petrochemical engineering, marine engineering and aerospace engineering, the vendor said.

Cost of the system resources for the use of Unistruc ranges from $90- to $300/hour, depending on the complexity of the model, the programs used and the proficiency of the user. CDC's Professional Services Division is available to aid customers in the use of the Unistruc service; more information is available from CDC at Box O, Minneapolis, Minn. 55440.

'Date Manipulator' Identifies Holidays

WOODSIDE, N.Y. — Version 3 of the Date Manipulator subroutine package is now available from CSB Systems. The package provides a "simple technique" for identifying holidays and days of the week and for performing arithmetic on dates, according to a spokesman.

Unlike other systems which use Julian dates, the Date Manipulator transforms dates into "absolute numbers" that can be handled as ordinary dates by another call to the subroutine. It contains a table of holidays which can be altered by the user to meet new requirements, he said.

Use of the Date Manipulator is said to help standardize techniques and prevent errors in a sensitive area. "Every Jan. 1 and every Feb. 29," the spokesman explained, "programs all over America start dumping. We think we can prevent that."

The package is written in IBM 360/370 Assembler and provides linkages for Cobol, Assembler and RPG-II. A source deck and documentation are available for $98. The documentation is available separately for $5, which can be applied to later purchase of the system.

CSB Systems is at 32-31 57th St., Woodside, N.Y. 11377.

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'Test Harness' Facilitates Structured Programming

By Duncan Connall

Special to Computerworld

At Turnkey Systems, Inc., we develop, market and install Task/Master, a widely used teleprocessing monitor. As a key element in an on-line environment, our product is subject to rapid change. To service our marketplace effectively we pay a great deal of attention to increasing software development productivity and reliability.

Two major steps have been taken in order to realize these objectives. First, we adopted structured/modular programming standards, in the design, review, programming and testing of new software components. Secondly, structured "walkthrough" sessions are used to ensure that the desired standards are observed and that they are worthwhile.

Having decided we wanted to use structured/modular techniques, we also decided testing was best handled by use of a general-purpose "test harness." This is a program which enables the programmer to set up the exact environment the module would have if it were executed in the real system. Thus the module can be tested repeatedly with varying input parameters, and the results — in the form of formatted dumps — can be readily and simply checked.

Although we were convinced a module testing harness was an essential component of structured/modular programming, we discovered there were virtually none to be found in the U.S. There was quite a variety available in Europe, however, and we decided to investigate further. After due evaluation we chose Testmanager, which is marketed by its designers and developers, Management Systems and Programming, Ltd.

Although at that time there was no U.S. coverage for Testmanager, we felt our systems programmers could handle any potential problems and we ordered the package by mail. Since then, we found the techniques required by Testmanager could be picked up very quickly even by our most junior programmers. It has now been in use for some 15 months and during that time we have encountered no bugs or other unusual problems.

In order to test an individual module (which we will call "sample") the programmer prepares an input stream of Testmanager command statements. They control the run and provide the data to the user's modules which execute on the supplied data.

Control is thereafter returned to Testmanager which, acting on further command, displays the results of the test. An extremely simple example might be as follows, given that in most cases module communication is established by passing information via parameters.

Using Testmanager a parameter may be defined by:

```
PARAMETER CASH-BALANCE 6
```

This established a six-character field named CASH-BALANCE, which can then be given a value by the command:

```
CASH-BALANCE         CHARACTER
'500.00'.
```

Assuming the module SAMPLE is required to do work on this field, and that the programmer wished to display the field afterward, the following commands will achieve this:

```
TEST SAMPLE CASH-BALANCE.
PRINT CASH-BALANCE.
```

If an error occurs during the course of testing, Testmanager diagnoses the error and allows the run to continue. The number of failures tolerated by the system before it finally halts the test is under the user's control.

This has been of tremendous assistance in terms of programmer productivity and, when allied with the facility for reexecuting the module any number of times with differing parameters within the same test run, greatly reduces debugging time.

If an error is a minor one, Testmanager may, at the programmer's discretion, take corrective action. This applies to such facilities as the automatic correction of decimal data exceptions where incorrect operands are changed into valid packed decimal format. This cuts out one of the irritating aspects of any validation-type of program — recurrence of diagnostics relating to the same error.

In addition, the system has the capability of printing expected results next to achieved results, highlighting any differences. This successfully prevents any small error (such as the position of a decimal point) from being overlooked.

Unlike some less sophisticated systems, Testmanager requires no modification to the programmer load module. A program which has been successfully tested in an isolated fashion will execute in identical fashion in a live environment. Development test decks are retained so that in the future, as modifications are made, the module can be retested against the original criteria.

Bountiful Benefits

What then are the benefits of our use of Testmanager?

- Easier estimating and better scheduling. If the work content of a module is smaller, estimating is more precise. Scheduling is thus simplified and, perhaps more important, modification to the schedule can be made without major disruption.
- Improved program design. This is an obvious byproduct of the need to preplan on a logical, structured basis.
- Less "fragile" programs. This is a major gain for us and was one of the major considerations in our move to structured/modular programming. Testing has become a considerably more thorough process.
- Module commonality. Because functions common to separate modules can now be easily identified, the expenditure on resources can be reduced.
- Easier program amendment and documentation. These are a result of the smaller, more easily understood units with which we are dealing.
- Improved staff appraisal. Improved estimating and scheduling have made performance easier to assess, and the more readily recognizable complexity of different modules enables a development path for staff to be clearly drawn.

No system is completely free of demerits, however, and there are some with modular programming, but we thought they were worth suffering to gain the advantages. Some of the disadvantages are:

- More extensive standards required. This is really two-edged, being in some senses an advantage in that it instills discipline and enables controls to be more precisely set. .
- Additional training required. This is a distinct overhead as far as our company is concerned. However, provided that future tasks are geared closely to a programmer's ability it can also result in improved job satisfaction (and thus output) and staff loyalty.
- Some increase in program size and a small decrease in performance. But the initial increase in program size can be offset by the easy identification and elimination of redundant code. As regards program performance, the improved program design made possible by a structured/modular approach means that this too can be reduced to a minimum acceptable by both ourselves and our users.

Of course not all of these pros and cons are the direct result of using Testmanager; some are more generally the outcome of using a structured or modular approach. However, one of the main reasons for this approach is that it does permit the use of such a test harness.

If nothing else, our debugging times have radically reduced - by up to 30%.

Connall is head of product development with Turnkey Systems, Inc., Norwalk, Conn.

Monitor Enhanced By Queue Controller

SAN FRANCISCO — Users of the Intercomm teleprocessing monitor from Informatics, Inc. are now able to enhance their systems with a dynamic data queuing feature being offered by Diversified Programming Services (DPS).

The utility enables users to reorganize queues when space becomes fragmented, to dump and restore queues, to copy data that resides on a queue to a sequential file, to scratch unwanted queues, to rename queues and to print records from queues, a spokesman claimed.

The package is available for $2,500 from DPS, 136 Emerson St., San Francisco, Calif. 94131.

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User Creates Own System to Gain Data Base Control

Data Basics

By Howard Griffin
Special to Computerworld

HOUSTON — Pullman, Inc. decided in 1975 to create its own data base after a study of existing data base systems showed none satisfied the requirement for management control over data processing.

The Pullman Data Management System (PDMS) enables the user to construct and maintain a tightly structured but extremely flexible data base that is easy to use and to expand with minimal or no effect on existing programming.

Some outstanding features inherent in the system are an active data dictionary, Codasyl compatibility, a "what-if" capability, built-in security and the ability to define sequential relationships, trees, hierarchies and networks.

The data dictionary is actively involved in functions ranging from data base description and design to actual execution of the application program against the data base. This guarantees the integrity of the data base, ensuring data base descriptions and the physical data base never differ.

Secondly; the Data Definition Language (DDL) is Codasyl-compatible. The DDL processor creates and maintains all data element descriptions, record descriptions, record relationship descriptions, names of programs used to access the data base and access rights for each program.

The Data Manipulation Language (DML) is not Codasyl-compatible. In the DML, storage and retrieval mechanisms are completely transparent to the application program, permitting changes to the access mechanisms (for improved performance, data base growth, etc.) without program modification.

Another quality of the system is the ability to test changes to an existing data base structure by entering a "what-if" statement before any desired changes. A listing of all affected programs, records, record relationships, etc., is produced just as if physical generation of the changes had taken place.

By using this capability, the user can see the results of his intended changes without physical alteration of the data base.

The fourth-mentioned feature, built-in security, limits access to the data base, protecting it from accidental or intentional misuse or destruction. It does this through the use of the active data dictionary.

This active data dictionary controls the execution of each application program. It permits delivery to the program of only those data elements specified for that program, allows only the types of access rights specified for that program (READ, WRITE, READ/WRITE), and traps all Abends. It also locks the data base whenever the physical data base and a data base description differ.

All relationships are logical, enabling the user to use one physical record in many different views/relationships. All accessing of records by an application program is logical. PDMS controls all physical aspects of the data base.

Establishing Relationships

The fifth feature — the capability to establish various relationships between records — permits a full range of structural definitions.

As an example of multiple views of a single record, imagine a company which supports various athletic teams. The bowling team maintains information on employee name, enployee address, bowling team name and bowling handicap. It is decided to automate all information.

Through DDL, the structure is created; through DML, records are inserted, modified and removed. Program Bowling-Prog maintains this logical data base.

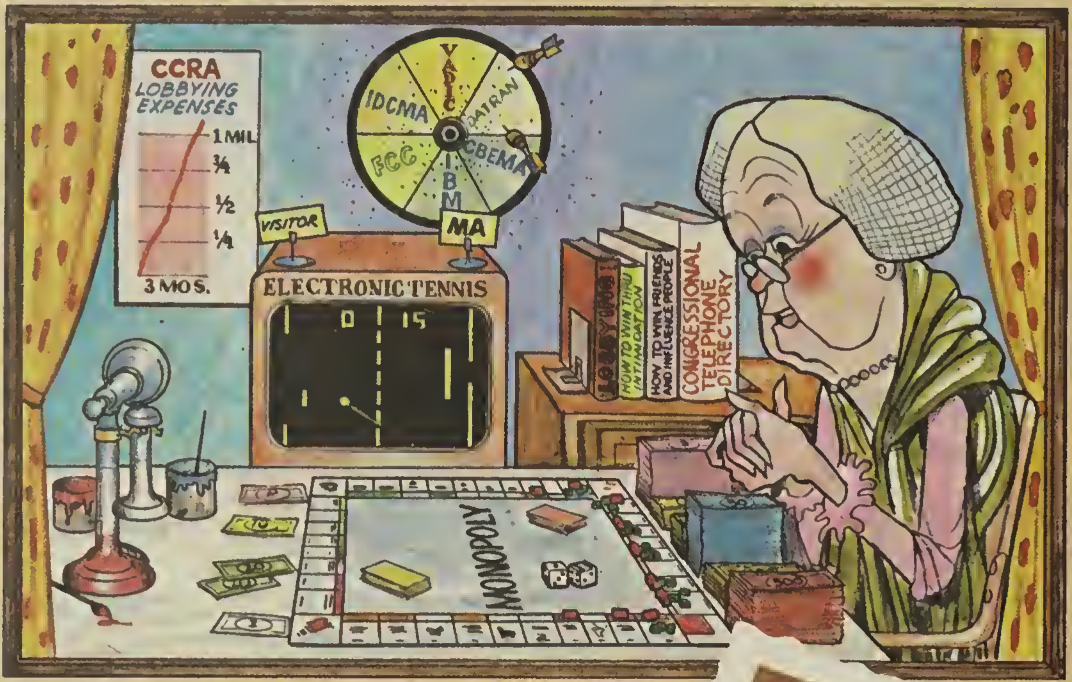
The golf team also decides to automate. The information it maintains is employee name, employee address, golf team name and golf handicap. Program Golf-Prog completely maintains this data.

Under PDMS, both sets of information can be built into one physical record including employee name, employee address, bowling team name, bowling handicap, golf team name and golf handicap by modifying the original bowling record to include golfing information. Bowling-Prog would still maintain the bowling information; Golf-Prog would still maintain the golfing information. And each would function as if the other did not exist.

By means of DDL, the record design could be modified to include other sports teams, and neither Bowling-Prog nor Golf-Prog would need to be recompiled or relinked.

Each of the programs could have information inserted, modified or deleted by DML since the physical data base is maintained by PDMS. Each new activity would have a program maintaining its logical data and it would function as if the other programs did not exist.

Griffin is director of data base services at Pullman, Inc.



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These field proven VA3400's have powerful displays and diagnostics, too. Using them, operators can pinpoint just about any malfunction in an entire data network. More big news, Ma. General Electric now leases, installs and services Vadic modems at over 50 locations nationwide. And Vadic backs them up with five regional on-line diagnostic centers.

When it comes to industry "firsts", Ma, Vadic sure hasn't been playing games.

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PS: Vadic has shipped over 125,000 modems to date.

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You probably never heard of PIX-II. But over 100 IBM users have in the 18 months since its development. They are using it to run 3277-type satellite links, consolidate multiple data centers, run CPU-to-CPU links without ACF, and perform remote processing functions as easily as local processing tasks. Find out more about PIX-II today. Send us the coupon, or call our nearest sales office. It's a data network alternative with seven benefits you cannot afford to overlook.

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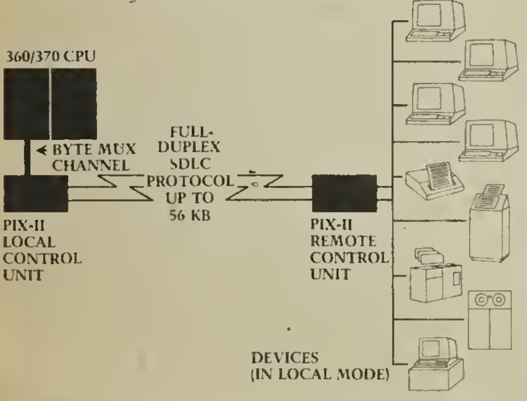
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'Keep Both,' User Advises

Syncsort or SM-1? Differences Difficult to Evaluate

Special to Computerworld

With regard to Syncsort [from Whitlow Computer Systems, Inc.], we have been using this package, revisions 2 and 3.5, in a partial mode for about two years now, under MVT and MVS. We have also been using SM-1 [from IBM] during this period for about 80% of the sorting.

Our reasons for using both packages result from an incomplete evaluation of Syncsort, this process being much more complex than it appears on the surface. Due to the incompletion of the evaluation, I am unable to give you any great concrete facts about the performance differences in the two packages (we have evaluated no others). The comments I make below are somewhat subjective, but I think you should be aware of them.

I have seldom encountered a package about which there is so much strong feeling, both pro and con and largely subjective, as I have about Syncsort; it's rather like brussels sprouts. In talking with other users of the package, I find some who think it is a gift to sorting, while others cast it aside. My own observations have shown that Syncsort may outperform SM-1, but this performance is largely due to the configuration of both hardware and software, particularly the former, under which sorting takes place.

Other factors which dramatically influence the performance of both packages are the types of data sets being sorted, the size and "shape" of these sets, the region size being used, the optimization parameters given and, above all, the types of devices and number of paths (channels) being used for both input/output and work. These factors would help account for the widely differing opinions of fellow users, as the performance differences would vary for each configuration.

This article was sent to Computerworld *by the author, who explained it is the text of a letter he wrote about a year ago when another user asked his opinion of sort packages he was evaluating. His cover letter noted, "As an interesting aftereffect, we ended up choosing IBM's Sort while our sister installation ended up choosing Syncsort."*

The author has asked that his name, title and employer not be published "for political reasons."

Because we do a great deal of sorting—about 40% to 50% of our workload—we have gone to some lengths to provide proper sorting environments: calculation of appropriate region sizes, the optimum number of work devices, device speeds and channel configuration. Our typical sort is as follows:

- Tape input and output, blocked at maximum (under MVS), typically about one-half to two reels at 6,250 bit/in., using the equivalent of IBM 3420-8 drives on two channels.
- A region size of from 120K to 360K (sometimes exceeding this for very large sorts, but only under very special run conditions to avoid paging problems).
- Three work areas on three 3330-11 disks (or equivalent) over two more channels.
- We currently are using MVS for all work on a 4M-byte IBM 370/168-I.

Under these conditions, and also earlier using MVT on this configuration and on a 158 with 3420-7s, I was unable to find any great differences between the performance of Syncsort and SM-I. This has accounted for the delay in definitely choosing one package over the other.

In some cases Syncsort's CPU time is slightly better than SM-I's, while in most cases the elapsed time is slightly worse. This does not include comparisons with SM-I's "Peer" technique which we have banned from general use, as it is not suited to a multiprogramming environment. This also does not include the few comparisons I have made using tape work files, where SM-I is consistently and dramatically superior.

From what I have been able to gather from other users, some conditions under which Syncsort will appear superior would be one or more of the following:

- Having insufficient work devices or fragmented areas possibly combined with a general lack of free disk space.
- Using too small region sizes.
- Using too few work channels.
- Using overloaded work channels, busy with other tasks. (Block multiplexer channels are overloaded when running over 45% busy.)

Attentive Supplier

As far as Whitlow Computer Systems is concerned, the firm has been very attentive as a supplier and much more open to product improvement suggestions than IBM, but this is to be expected. Whitlow representatives have visited our center on several occasions during benchmark runs and have gone to great lengths to adjust optimization problems that have occurred with Syncsort.

While this in itself is impressive, I am worried that if we had accepted Syncsort before going to MVS and therefore not performed additional benchmarks, would we be missing these "fixes" to the optimization section of Syncsort simply because there was no basis for comparison and no representative thoroughly analyzing performance in a different environment from the original.

This last comment reflects another interesting aspect of sort evaluations: looking at not only today's environment, but that of the future too. Consider the following: New applications are being designed constantly, and one particular product may be superior for them. Also, if you are like most installations, you often go through an equipment upgrade. Who is to say what will be best on another configuration?

This is compounded with the fact that Syncsort and SM-1 seem to be in a "race up to the wire" with one occasionally pulling ahead of the other as new revisions are issued. Whitlow feels very competitive with IBM and IBM feels very competitive with everyone.

Frankly, if someone demanded an outcome of my study tomorrow, I should be inclined to say, "Keep both packages and use the one that suits the particular sort best."

Since we work in a service bureau environment, this would tend to keep our clients happy too, as they have their own subjective reasons for preferring one package over the other.

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ABA Finds in 'Benchmark' Survey

Banks Relying More on Communications

By John P. Hebert
Of the CW Staff

WASHINGTON, D.C. — The CRT is the most widely used data communications banking terminal in this country; banks' telecommunications costs rose 26% between 1974 and 1976; and only 20% of banks have a formal plan for their future use of telecommunications.

And, according to the American Bankers Association (ABA) 1976 Telecommunications Survey, the financial community spends over $550 million annually on telecommunications, or roughly 1.2% to 2% of banks' total operating costs.

ABA called its first telecommunications survey "a benchmark report" which categorizes telecommunications statistics by geographic region, by deposit size and by unit and branch banks.

In its 98-page report on the survey's results, the ABA said it gathered responses from 817 of the 3,034 banks which received its questionnaire.

Almost all (95%) of the banks surveyed with deposits exceeding $500 million use CRTs, while 72% use teletypewriters. The Bell Touch-Tone telephone/terminal had found a place in 68% of the large banks surveyed, ABA said.

More than half (59%) of medium-sized banks use the CRT, while teletypewriters and the Touch-Tone were distant runners-up at 39% and 28% respectively.

The only type of terminal not found in small banks was the point-of-sale card reader, although 14% of the small banks (those with deposits less than $100 million) said they planned to use it. In contrast, 21% of small banks used the CRT and 22% were planning to use it, the ABA found.

Large banks skewed survey results on the average number of terminal connect hours accumulated monthly reported by all banks with 25% of the total 2,080.5 average hours.

More than 50% of banks with deposits less than $500,000 did not respond to the question, while 22% of all banks with deposits greater than $500,000 did not respond, according to the ABA.

Other survey findings suggested most telecommunications plans cover areas of expenses for capital expenditures, operating expenses and new services costs, rather than expenses related to the personnel needed for the telecommunications function.

Reliability, Availability

Data transmission lines were rated as excellent by 37.3% of the 287 banks responding to the question, while 58.5% said the lines were satisfactory. Users were evenly split on rating the lines' availability as good or excellent, while 5.3% said line availability was poor.

The reliability and availability of international services were looked upon less favorably with 9.4% and 10% respectively of the respondents rating them as poor.

Users were more pleased with modem reliability which received an excellent rating from almost 52% of the 220 respondents and a poor rating from 4.6%.

Terminal reliability was rated excellent by 36%, while 60% of the 245 respondents thought it was satisfactory. Teletypewriter service was rated excellent by 40% of the Telex and TWX users, the survey results showed.

About 36% of users stated time-sharing services were excellent, while 10% responding to the question felt there was poor availability.

The report of the survey results is available for $30 for ABA members and $60 for nonmembers from the ABA at 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

Clarification

Vadic Corp. was the first supplier to receive registration authorization from the Federal Communications Commission (FCC) for direct connection to the telephone network [CW, April 4].

The Vadic unit was approved under the rigid technical "long form" procedures spelled out in the FCC rules.

Several other modems were approved under less rigorous standards using grandfather provisions of the FCC program.

Carrier Industry Structure Seen Evolving Into Regulated Tiers

By Edith Holmes
Of the CW Staff

CAMBRIDGE, Mass. — The need for a new Communications Act and Bell's effort to have national policies designed its way aren't the only issues confronting the Federal Communications Commission (FCC).

While the ultimate rewrite of the Communications Act of 1934 and/or the adoption of the AT&T-sponsored Consumer Communications Reform Act will greatly impact the common carrier industry structure, that structure is an FCC policy consideration in its own right, according to Dale N. Hatfield, chief of the FCC's Office of Plans and Policy.

"Barring major redirection from the Congress, I see the common carrier telecommunications industry evolving into several tiers with differing degrees of regulation," Hatfield told a Harvard University audience here recently.

Needs which demand a significant portion of FCC policy makers' time as well, he said, are a better understanding of the investments made in the nation's common carrier services, a clearer definition of the distinctions between communicating and computing, a determination of the boundaries separating services provided by the common carriers and those offered by the U.S. Postal Service and electronic funds transfer (EFT) systems.

In Hatfield's view of the industry's structure, basic long-haul transmission capacity would be supplied on a "wholesale" basis by several firms using competing technologies. All of these firms would be subject to full and detailed regulation.

This is the second of o two-port series detailing the future issues focing the Federol Communicotions Commission (FCC).

The first orticle focused on the argument for rewriting the Communicotions Act of 1934 and the effects of the proposed Consumer Communicotions Reform Act on carrier services ond terminol equipment.

This orticle discusses the possible need for restructuring the common corrier industry ond the FCC's role in such on effort.

At the next level, "retailers" would add switching, multiplexing or engineering management to the wholesale capacity obtained from long-haul transmission suppliers, Hatfield said.

These retail suppliers, with the exception of the suppliers of regular message toll ser-

(Continued on Page 34)

German Carrier Net Designed to Handle Future Data Traffic

FRANKFURT, West Germany — The number of terminals handling data traffic on telecommunications links in the 17 European countries will be increased to over one million by 1985, according to a "Eurodata" market study.

To cope with the expected rapid expansion in remote DP, the Deutsche Bundespost (DBP) has decided to set up a national data network.

Worker checks operation of data repeater used at 9-kilometer intervals to refresh transmission pulses in Deutsche Bundespost 2M bit/sec network.

The 2M bit/sec circuits of this network are intended to interconnect the telegraph and data switching centers of the system and to perform a great variety of other remote data transmission tasks,

The initial section of this network, which is the first of its kind and size in Europe, is being set up by Siemens A.G. between Frankfurt and Mannheim; it was recently handed over to the DBP.

When the network is completed at the end of 1978, it will cover the entire Federal Republic of Germany, the study reported.

Technical and economic considerations made the long-haul Cable 17 the obvious transmission medium for the exchange of data on a national basis, the study said.

This cable, which was previously used exclusively for long-haul traffic, is in service in a geographically oriented meshed network connecting all the large cities in the

(Continued on Page 39)

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Sierra Tester Checks Transmission Errors

MENLO PARK, Calif. — Sierra Electronic has introduced the Model 920B error test set for digital testing of data communications systems.

The Model 920B features optionally selectable interface modules and connects between the modem and terminal for bit and block error rate measurements.

The unit reportedly provides asynchronous operation to 9,600 bit/sec and synchronous operation to 2M bit/sec.

Interface modules are currently available for RS-232C, CCITT, TTL-compatible and wideband balanced inputs. The basic instrument features direct error rate readout, timed test intervals and three data test words as well as special controls and status indicators, the firm said.

The Model 920B costs $1,795; additional interface modules cost $250 each, a spokesman said from 3885 Bohannon Drive, Menlo Park, Calif. 94025.

Unit Converts Data Formats

SAN JOSE, Calif. — A communications interface/controller designed to link paper tape readers and punches to computer and communications hardware has been introduced by Fairchild Camera and Instrument Corp.

The Model 6600 is a general-purpose interface that takes data from a 16-line RS-232C link and converts it into a form acceptable to the 8-bit parallel interface of most paper tape readers and punches, Fairchild said.

The device also can take 8-bit data from the paper tape equipment and convert it to the RS-232C standards used by computer and communications equipment, the company added.

The 6600 simultaneously operates as a peripheral controller, accepting asynchronous commands and generating the required reader or punch operational control commands, according to the firm.

As a controller, it can be configured to generate a one-command character or a two-character command sequence.

Front-panel controls are used to select the data path to the local terminal or modem, to activate the tape punch or reader, to advance or rewind the tape and to select a local or remote command mode, Fairchild noted.

Back-lit displays continuously indicate the interface and control status, it added.

Internal switch selection permits speeds up to 9,600 bit/sec, parity character, stop bits and character size.

The 6600 is completely transparent and is not affected if the user transmits odd character codes or binary data, the company claimed.

Prices are $595 for the single-port 6600 and $695 for the dual-port version, Fairchild said from 1725 Technology Drive, San Jose, Calif. 95110.

Carrier Structure Seen Stratifying By FCC Policy Chief

(Continued from Page 33)

vice, would be subject to minimal regulation as resale or "value-added" vendors, he continued.

The provision of message toll, or regular telephone service, would remain a regulated monopoly service, according to Hatfield.

Nontariffed Equipment

A third level would be the provision of terminal equipment which would be supplied largely on a nontariffed competitive basis.

"Regulation at this level would be minimal — essentially limited to ensuring technical compatibility and preventing covert second-level activity through the leasing of computer switching capacity, for example," he said.

Finally, a fourth tier would involve the addition of DP functions to second-level communications services in order to provide complete information service packages, Hatfield stated. Again, regulation at this level would be minimal.

The thrust of this scheme and others like it is to "allow for maximum competition and innovation in the provision of specialized services while preserving detailed regulation where "natural monopoly or other public interest factors require it," Hatfield explained.

"In other words, regulation would be applied judiciously and only to the extent that competitive market forces cannot be relied upon," he continued.

Far from being a panacea, this proposed industry structure would not eliminate the problem of preventing cross-subsidies between monopoly and competitive services without unduly restricting firms from competing at more than one level, Hatfield said.

The commission must also be careful to avoid discouraging innovation in designated monopoly areas, he added.

Still another policy issue facing the FCC is the need to pay more attention to the total amounts of the nation's productive resources that are devoted to the provision of common carrier services.

The U.S. may have the best telephone services in the world, but this achievement requires "a significant fraction of the rights to all real productive resources — namely land, labor and capital goods," Hatfield said.

"It is estimated that one-ninth of the total private corporate capital assets are employed in this effort," he noted.

May Be Over-Investing

Compared to other countries, the U.S. may be over-investing in telecommunications, the FCC official said. On the other hand, it can be argued that an even greater investment should be made in communications because of its role in the information society, he added.

Hatfield said it is difficult to assume that within the communications industry, there is a competitive market for these investment funds. Other firms competing for capital with Bell often operate without guaranteed rates of return and market power.

Their potential return on investment might actually exceed that of a single project buried within a horizontally and vertically integrated telephone company, he suggested.

A cluster of additional policy issues stand at the boundary of the FCC's regulation of common carrier services, Hatfield said. One of these issues is the dividing line between regulated common carrier communications and unregulated DP activities.

Distributed processing and "smart terminals" are but two technological developments that make definitions of communications and DP difficult for the FCC, he stated.

Still another issue is the boundary between services offered by the communications common carriers and those provided by the U.S. Postal Service.

Teaching your computer to count cornflakes, cookies and whoppers.

A special report on *Source Data Entry* in the May 30th *Computerworld.*

A great deal of attention and effort has been directed toward automating the data entry process over the years. And it's easy to see why. The usefulness of your entire computer system is inextricably linked to the speed and reliability with which you convert raw data to machine-readable form. *Computerworld's* May 30th special report will be looking at just how far we've come with data entry — and, possibly, where we're going.

Edited by Frank Vaughan, this report will take a comprehensive look at source data entry methods, including:

- Places it's commonly used — supermarket check outs, airline reservation systems, hamburger stands, etc.
- A survey of contemporary equipment — scanners, POS registers, badge readers, mag stripe readers, key-tape and key-disk systems, the newer hybrid systems, and the emerging technology of voice data entry.
- An evaluation of the impact distributed data processing (DDP) is having on distributed data entry (DDE) — do these approaches dovetail or does DDP diminish the use of DDE? Are large scale, centralized data entry sites becoming obsolete?
- The state of the art — equipment speeds and technical trade-offs. Innovative applications like voice input and using the telephone as a terminal.
- What's ahead — Input from smaller users just getting into computer automation through data entry; e.g., how merchants regard the costs, projected savings, and their need for automated data entry methods. Possible impact on consumers.

If you're a DP manager, supervisor, or corporate manager who's concerned with the cost effectiveness of DP, be sure you read the special report on Source Data Entry in the May 30th *Computerworld*. If you manufacture and market data entry equipment you'll want to advertise here. Don't miss the May 13th ad closing date. Contact your *Computerworld* salesman — or call Terry Williams at (617) 965-5800.

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DP Dialogue

Notes and observations from IBM
that may prove of interest to
data processing professionals.

F.W. Woolworth operates some 1,800 retail stores across the U.S. Now one IBM 3800 Printing Subsystem helps to speed sales, merchandising and accounting reports to store managers and regional offices.

Superfast Printer Aids Woolworth Marketers

Until a few months ago, the Central Accounting Office of F.W. Woolworth Company had to keep six high-speed printers running at top speed more than 20 hours a day.

This constant production was required to provide a wide range of reports used throughout the company.

Now one IBM 3800 Printing Subsystem prints most of Woolworth's reports—at a top speed of 13,360 lines per minute, using laser and electrophotographic technology.

The Central Accounting Office in Milwaukee produces a multitude of major weekly and monthly reports for the Woolworth and Woolco retail stores, as well as for regional offices and corporate executives. Some reports must be produced in many different versions for different recipients; a printing run can involve multiple pages for each of the 1,800 stores.

The office also pays over a million invoices a month, bills over one million credit card accounts a month, and handles capital accounting, tax accounting, and other reporting functions—for which the 3800 prints the output.

Formerly, just scheduling output through six printers — two 1,100-line-per-minute and four 600-line-per-minute units—had been quite a difficult challenge, says Patrick J. Nelis, division manager of data processing. "And this is perishable information: store managers need it in time to make operating decisions.

"Some reports took 8 to 10 hours to print. Switching forms from, say, two-part to four-part paper took time. And then we had to deleave and burst, and sometimes collate the output of two or three printers to assemble one report.

"But the 3800 is so fast that multipart paper and carbon paper can be eliminated. A report required in multiple copies is simply printed the required number of times. This also eliminates the time and additional cost of deleaving and handling carbon waste, and everyone now gets an original.

"We paid as much for carbon paper as for printing paper," Nelis says. "Two-part forms cost approximately three times as much as single-part forms. All told, our paper cost savings are running more than 16 percent.

"In addition, we've reduced our forms-changing operation, our printer scheduling headaches, and much of the effort of separating and assembling reports after printing."

With one special character set, the laser prints straight horizontal and vertical lines. "Some of our report forms change as new requirements emerge," says Nelis. "With this capability of the 3800, we can meet these needs without printing new forms and discarding supplies of old ones."

Endangered Plants Get Help from the Computer

The Notre Dame computer data base is made up of over 100 species of the mustard family found in U.S., one of which is the threatened Streptanthus hispidus shown here.

Because of man's steady encroachment on the environment, hundreds of plant species in the United States may face early extinction. The Office of Endangered Species of the Department of Interior issues periodic lists of "threatened" or "endangered" species. But protective action is largely up to individuals.

Now botanists have a natural ally in the computer, which is being used to make existing data on plants, including endangered ones, far more accessible and useful.

Under the direction of Theodore J. Crovello, professor of biology at the University of Notre Dame near South Bend, Indiana, data on over 100 species of the mustard family found in the U.S. has been entered into the computer. This is one of the first attempts to computerize a monograph on plants. Data on over 35,000 individual collections of mustard plants preserved in museums across North America has been captured in the Notre Dame data bank.

"Although this data has been available for decades, we had to wait for the computer as the medium through which we could rearrange and analyze it efficiently," says Dr. Crovello. "Now we can determine in seconds the counties of the U.S. in which a supposedly threatened species has been known to occur, and how long it has been since it was last collected."

Dr. Crovello points out that "the IBM System/370 Model 158 can swiftly print maps of the entire U.S., or of a particular state, according to selected criteria, such as the relative similarity among the counties of the species' distribution. And it can answer questions such as, 'At what time of the year is this species in flower?'

"There are an estimated 250,000 species of vascular plants in the world, 20,000 of them in the United States," Dr. Crovello points out. "Modern classification of these plants has been going on since the 18th century, with the resulting data accumulating in collections and catalogs scattered all over the world.

"Inevitably, such data varies greatly in precision and completeness, presenting real difficulties of nomenclature and missing information. Nevertheless, the development of large computerized plant data banks is now demonstrably feasible as shown in several projects. It represents a major breakthrough in plant systematics and related fields, permitting comparative studies of plant life on a scale not hitherto practicable.

"And it might possibly help to preserve some of the many rare species of plants now in danger of vanishing from the earth."

DP Dialogue is designed to provide you with useful information about data processing applications, concepts and techniques. For more information about IBM products or services, contact your local IBM branch office, or write Editor, DP Dialogue, IBM Data Processing Division, White Plains, N.Y. 10604.

IBM
DATA PROCESSING DIVISION

Firm Finds Dumb CRTs a Smart Way to Lower Costs

Terminal Transactions

By Toni Wiseman
Of the CW Staff

LOS ANGELES — If your users are in the business of frying hamburgers and not of groveling in the bowels of technology, an on-line network of dumb terminals may well be the answer to your data communication needs, according to Timothy G. Canan.

Canan, data communications analyst at Host International, told attendees of a users' program here recently that his firm had found it impossible to justify the cost of a network of intelligent terminals. However, the firm found it could satisfy its needs in terms of cost, volume and response time with dumb terminals on-line to a minicomputer, he added.

Since the food and beverage business is a low-margin environment, costs in all areas have to be kept low to show a profit, he said.

In 1973, Host contracted with Haskins & Sells for a study of its business since it was finding itself bogged down in paperwork. "As the sales got greater, the number of people per unit of sales also seemed to grow," Canan said, noting the firm's accounting system was not automated.

The Haskins & Sells study showed the need for an integrated accounting system, with a greater degree of information than was currently available. This would allow management to make better use of the information and resulting reports, he said.

"The study also concluded that if Host continued as it was, the manual clerical system would be a limiting factor. We would be sucked into a quagmire," Canan stated.

Haskins & Sells recommended implementation of an integrated accounting system and a branch transmission system. But how was Host to go about doing this?

Host had, in the past, made an attempt at transmitting payrolls over a custom designed system, which, according to Canan, turned out to be a white elephant. As a result, the company was doubly cautious of another venture into data communications, he said.

Time-Sharing Too Costly

Based on this, Haskins & Sells recommended a time-sharing approach and Host went to General Electric (GE).

At the time, Host already had a Burroughs Corp. B2771 in-house which was being used for payroll and general ledger.

Development of a financial data collection system went quickly and smoothly with GE with the use of dumb terminals and very inexperienced users, Canan said. In fact, in many cases, the terminal operators were the restaurant hostesses and did not even have typing experience, he noted.

The primary problem of working with a time-sharing firm is cost, Canan indicated. The system's reliability was good, the software was excellent and Host was able to design its own user interface, but the cost was high.

Host was running about 6,000 sessions each month, with each session averaging 1/10 of an hour at $4/hour, or about $24,000/mo, Canan said. Neither Host nor GE was able to get the costs down, he added.

As a result of costs and because Host also wanted to be able to decide job priorities and maximize response time, the firm decided to go in-house.

Selecting an Alternative

"We spent a lot of time selecting an alternative to time-sharing, and it soon became evident that the only alternative was our own computer. And price/performance seemed to dictate a minicomputer," Canan said. "In addition, a mini was oriented to communications."

The selection process narrowed the field of vendors down to Digital Equipment Corp. and Data General Corp., he told the audience.

But at that time, some two years ago, DG did not have a time-slicing arrangement, which Host considered essential. Rather, tasks were run serially, Canan explained.

DEC had three times the throughput and was only slightly more expensive, he said, noting the same situation is not necessarily true today.

"We also ran tests on a large-scale Burroughs since they were our in-house mainframe supplier. We soon found we would have had to go to a $1 million Burroughs machine to get the throughput of a $145,000 DEC machine," he said.

Host finally settled on a DEC PDP-11/70 with 256K bytes of memory, 88 million bytes of disk, a single tape drive, 165 char./sec serial printer and a VT52 system console. Host also has a communications multiplexer with 14 ports capable of transmitting at either 110- or 300 bit/sec.

"One of our main concerns with getting the computer was response time, which means our kind of processing became an important factor," Canan indicated.

"Our processing is worse than transaction processing because we batch it and then expect it back in a couple of seconds," he said.

"In our environment, we frequently have five and sometimes 10 users simultaneously transmitting data which involves up to seven open files per user."

Even so, using GE Terminet 300s on-line to the 11/70, response time averages two to three sec, though it may degrade to 10 sec for a minute or two a couple of times a month, he said.

Host is using in-bound Wats lines (Zone 5) because the volume of its transmissions is not that high, he said.

About 30 hours of connect time per month is probably the maximum, with 15 hours average, he noted.

"With that kind of volume it would be hard for us to justify any other kind of network," he said.

The lines are not leased so the quality varies from call to call, he said. However, if the line noise is excessive, the user can simply redial and go through another circuit.

Host has not installed any backup for its system. "Our backup is the fact that the only thing that is time critical is payroll.

"So if the 11/70 breaks down and can't be fixed in two or three days, we will hand write the checks," Canan said, adding so far te system downtime has only been a couple of hours a year.

Canan told the audience that Host could convert to intelligent terminals without any drastic hardware changes, but the cost factor is too high.

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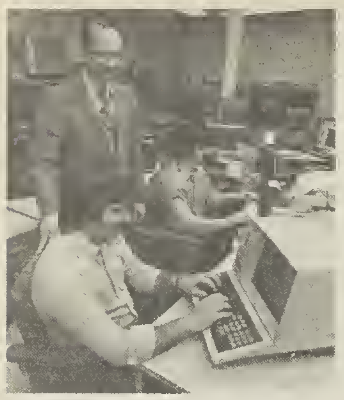

Acushnet computer operators control time-sharing operations under the supervision of DP manager Ray Gabler.

Special to Computerworld

NEW BEDFORD, Mass. — A manufacturer of golfing equipment and custom-molded rubber products here said it increased its data entry throughput by at least 25% and eliminated three major sources of input errors after replacing keypunch equipment with programmable CRT terminals.

According to Raymond Gabler, DP manager at Acushnet Co., the firm also reduced its punched card costs by 80% after installing eight local IBM 3270-type terminals.

The independent terminals replaced a total of 11 keypunch machines and verifiers, Gabler said.

"That cost saving in cards was sufficient to pay for teleprocessing software. The terminals provided a greatly improved data entry capability as well as a growth path to on-line teleprocessing," he said.

"Any company operating in a partitioned, batch environment with excess capacity on its mainframe or any company which can afford $10,000 to buy [an IBM] 360/30, could well find keypunch replacement to be the most economical route to a teleprocessing system capable of supporting interactive processing concurrent with batch operations," he added.

Data entry applications for the PTS-100 terminals from Raytheon Data Systems Co. include entry of orders for the molded rubber products the company sells to the petroleum, auto and other industries, as well as other traditional keypunch chores such as payroll, accounts payable and receivable transactions.

Other PTS-100s are used in a time-sharing mode under IBM's VM/370 by Acushnet's corporate R&D group in problem-solving applications and by the company's business systems programmers and technical support personnel for software development.

The terminals, which operate at an effective transmission rate of 25 kbit/sec, are interchangeable in terms of the functions they can perform, Gabler pointed out. For example, Acushnet will be able to move terminals currently used for centralized data entry out into operating departments, where they will provide department managers with an on-line inquiry/-response capability in addition to source data entry, he said.

Acushnet uses an IBM mainframe; it converted from DOS/VS to the VM/370 operating system capable of supporting multiterminal time-sharing under the Conversational Monitor System (CMS) while concurrently supporting the batch requirements of DOS/VS, he explained.

The company increased main storage, added a Memorex Corp. 1270 communications controller and attached a configuration of four PTS-100 terminals locally.

"We selected Raytheon to supply 3270-type terminals because it offered good delivery and service capability equal to or better than that of any other vendor evaluated," Gabler said.

"As for cost, the advantage was not immediately apparent at the four-terminal level, but we knew we would require additional equipment. The incremental cost curve for extra Raytheon tubes was shallow when compared with the competitive cost curves for other 3270-type equipment," he said.

The company then conducted a two-month experiment under which business systems programmers who had previously relied on the batch system were given two Raytheon terminals for interactive program development using Computer Associates, Inc.'s Interactive Disk Operating System (Idos/VS) package that adds full DOS/VS data management capabilities to IBM's CMS.

"The results were improvement in programming throughput ranging from 50% to 1,500%," Gabler recalled. "One particularly complex job could not have been programmed at all in time for a deadline unless the interactive terminals had been used," he said.

(Continued on Page 39)

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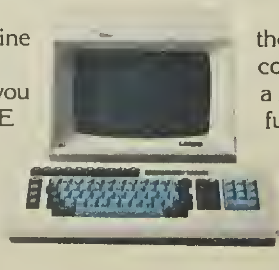

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German Carrier Net Built to Handle Future Traffic

(Continued from Page 33)

country.

To transmit data over the phantom circuits of the symmetrical conductor pair of this cable without impairing the simultaneous 3,000 long-distance telephone calls, Siemens joined with the DBP to develop the time-division multiplex remote data transmission system — PCM 30 D, the study indicated.

The multiplex terminal of this system groups to up 30 64 kbit/sec data signals (defined interface in long-haul traffic) into a 2M bit/sec signal, which is transmitted over the phantom circuits in the 1-to 3MHz frequency band.

To refresh the pulses on the digital long-haul link, remotely fed regenerators are installed in the repeater stations set up at intervals of 9 kilometers along the long-haul Cable 17a.

A maximum of 17 such regenerator sections make up a supervised section, both ends of which are terminated with line terminals having interface conversion function.

The 2M bit/sec transmission speed of the PCM 30 D system permits the exchange of data packets of any size in interactive operation under computer control or the exchange of information between thousands of teleprinters at one and the same time, the study stated.

The system can also handle anticipated services such as telegraphy for general business office applications as well as for facsimile transmission of typed communications and drawings.

A 64 kbit/sec data line transmits a DIN A4 size page or an archive picture in a matter of seconds over hundreds of kilometers.

Should these services one day exhaust the initial capacity of the national data network, adequate reserves are available, the study noted.

A total of seven such systems can operate over every existing transmission path without it being necessary to lay new cables, it added.

Firm 'Lofts' Input Rate With CRTs

(Continued from Page 38)

"We purchased Idos/vs and installed nine additional PTS-100 terminals permanently, one for each of our business programmers, then upgraded our IBM 370/135 system to a 768K 370/145 to satisfy response requirements," he added.

Keyboards Modified

The problem-solving/software development system had outpaced Acushnet's keypunch-based data entry capability, according to Gabler. He rejected off-line keypunch replacement systems in order to avoid the isolation and incompatibility of a separate system and the logistics associated with disk-to-tape transfers.

"We had come to appreciate the advantages of 3270-type terminals — their large screen size, speed, full-duplex operation and screen management capabilities — but our data entry operators were totally oriented to keypunch machines. We knew productivity would decrease if we switched to any of the different keyboard layouts that are standardly offered with the 3270.

"We wanted to make perhaps a dozen changes in the data entry keyboard layout of the 3270 to obtain the needed keypunch compatibility in terms of function and keyboard position," Gabler said.

"The changes were relatively easy because the architecture of the PTS-100 system stores the definitions of key functions in a software table in the controller.

"We purchased the Datacom/--DC teleprocessing monitor from Insyte Datacom Corp. in Dallas and obtained the basic data entry application code from it around that same time."

The Datacom monitor, essentially financed by the cost saving on punched cards, provides efficient terminal control, task control and file control functions which greatly facilitate software developement for multiterminal applications, Gabler said.

"Operators can stop working on a batch of data at any time and resume work on that batch later, even from another terminal," he added.

"The system automatically maintains statistics on operator performance in terms of keystrokes, documents entered, elapsed time and number and types of errors. The system allows us to develop productivity standards," he said.

Acushnet plans to partially decentralize its data entry operation by moving the terminals directly into user departments to handle inquiry/response as well as data entry requests.

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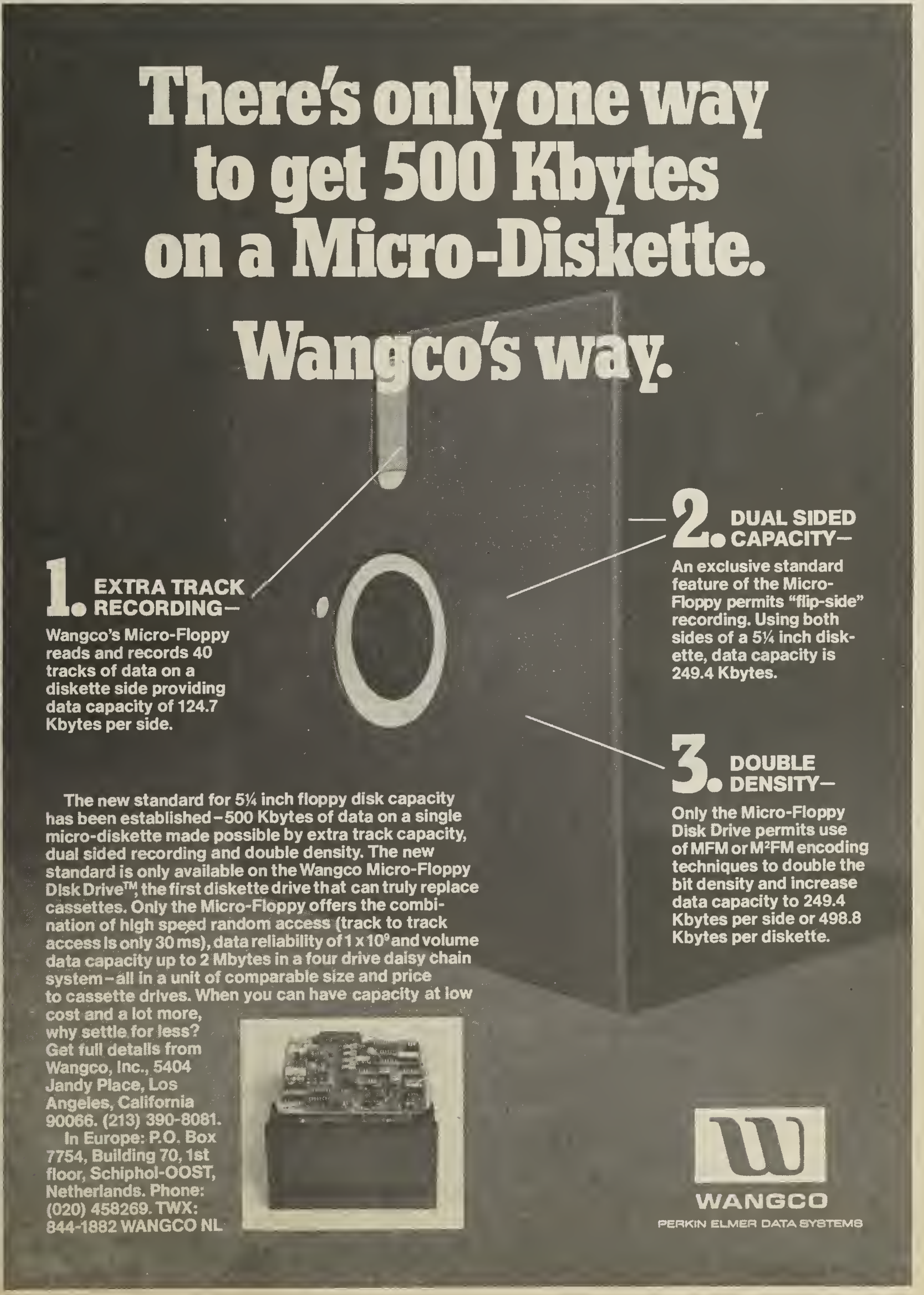

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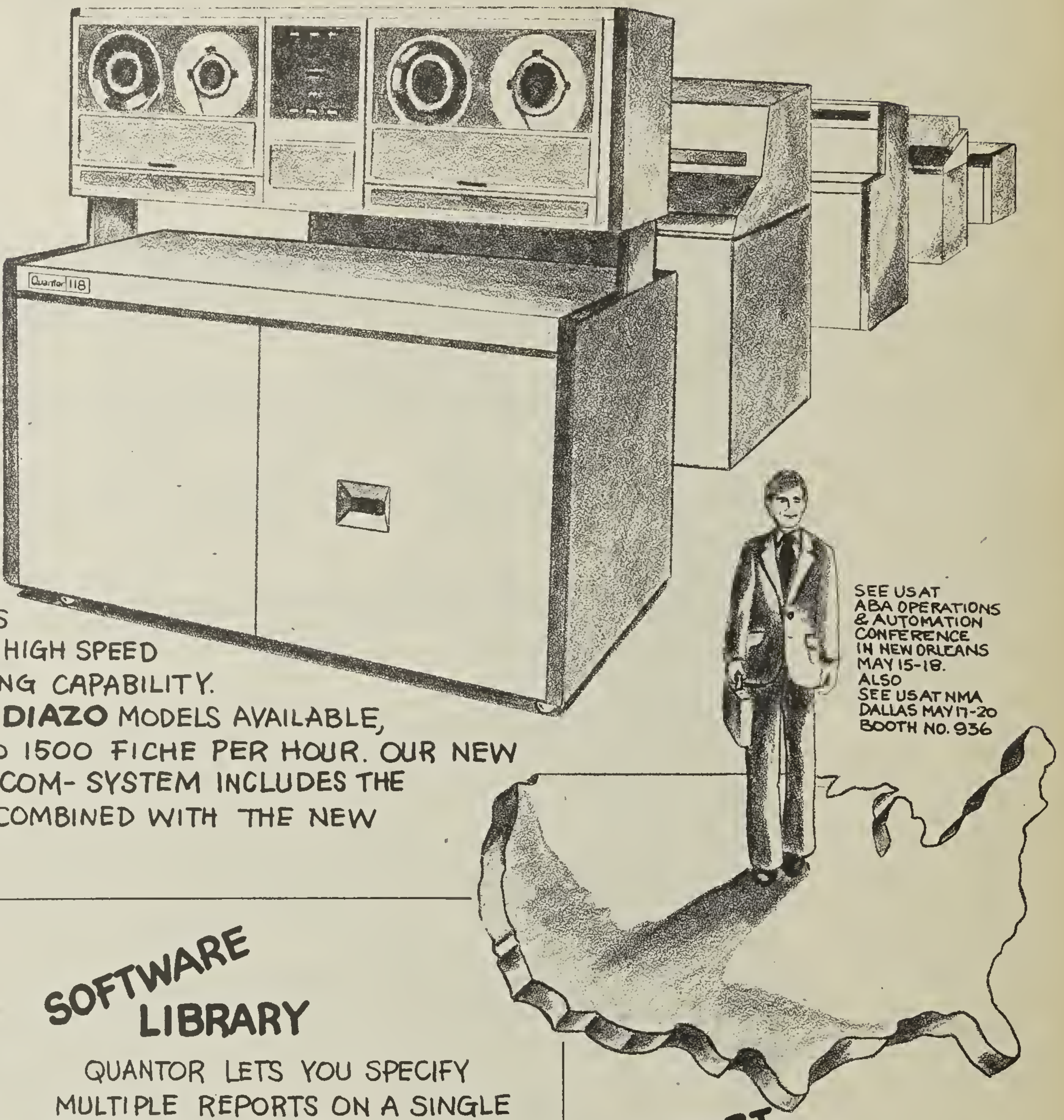

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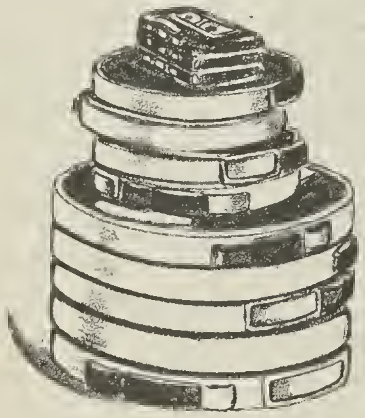

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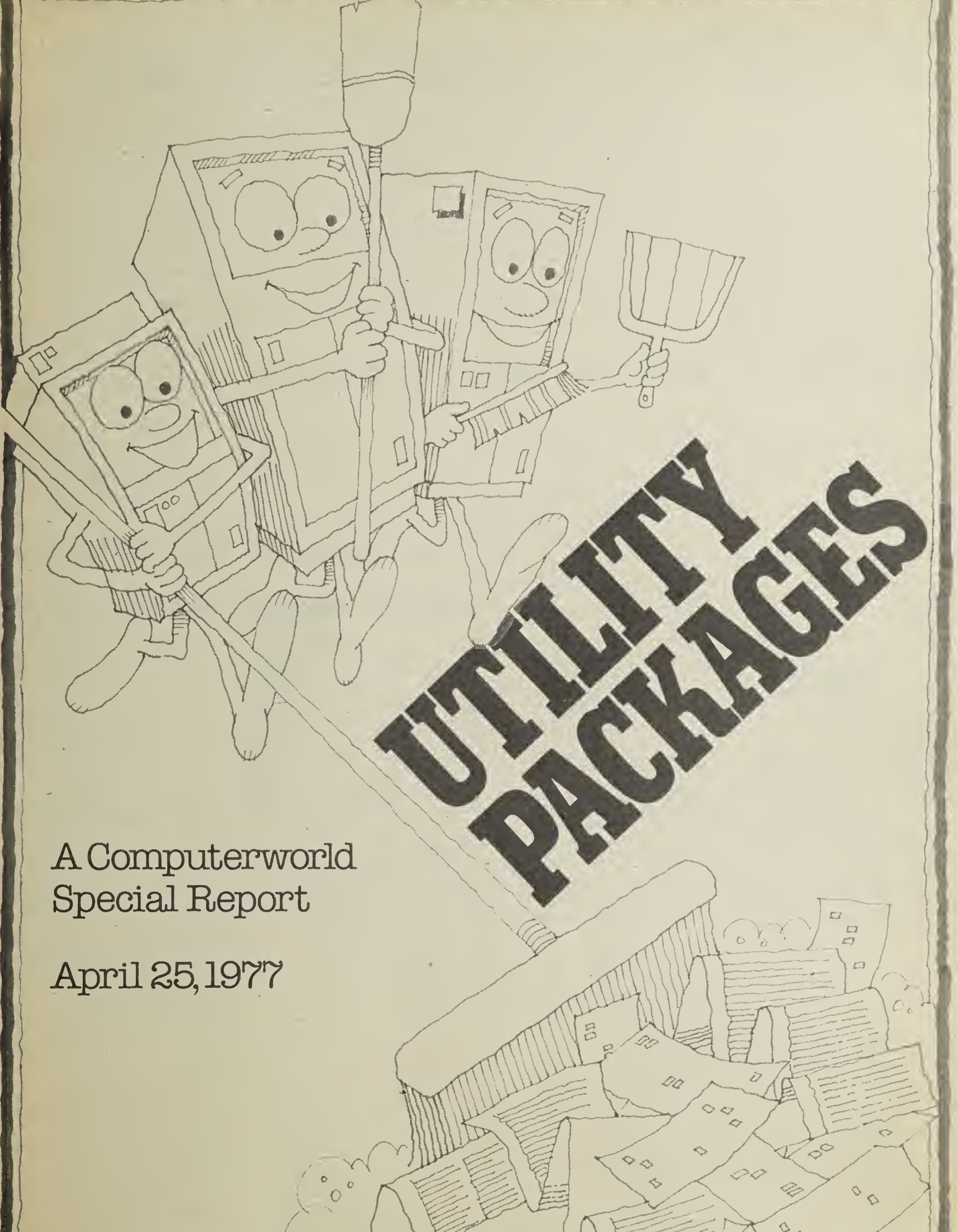

UTILITY PACKAGES

A Computerworld
Special Report

April 25, 1977

Did the Job and More

3M Division 'Scores' in Major Three-Way Merge

By Don Leavitt
Of the CW Staff

CHATANOOGA, Tenn. — Even if a package isn't used much anymore, a DP manager can speak positively about it if he feels it was cost-justified by the work it did in its first year on the job.

That's the situation at American Lava, or rather at a division of the 3M Corp. that used to be American Lava — and that change in the user's corporate status is the key to the use of the package in question. But let manager James Hurst describe what happened.

American Lava had a batch-oriented 64K NCR 201 back in April 1974. It was loaded with a variety of programs all geared to the needs of the company. But then the company became part of 3M and the systems had to be converted to fit the standards of the new parent company.

That meant combining information from several sources, including existing files here and at 3M headquarters in Minnesota along with some supplementary data here. NCR had a package called the General Reporting System with which American Lava could extract information from a file, but it couldn't merge two files into a single new one, Hurst said.

So he looked around for commercially available software that could solve his problem. He found very few had the NCR compatibility he required but he didn't need any more than one and he found that: it was the Score package from Programming Methods, Inc., now part of Informatics.

The company needed a new customer master file and this was a major task, according to Hurst, because he wanted to make it a much bigger file with much more information than before. "We also had to format it to coincide with a companion file up in St. Paul at 3M headquarters," he added.

That was the job in which Hurst and his crew — now five programmers and analysts — had to handle the three-way merge. "So we put together a Score program and did the job," he said. As part of that same basic conversion project, they also had another dozen files they had to update with information off 3M corporate files. And again, Score served the purpose.

"That was the main use we had for Score but that conversion project by itself more than paid for the package. We had our justification," he said, adding, "now I guess we generate about a dozen reports a year with the system. Every once in a while it's very handy, and since it's alredy paid for, current use is a bonus."

Not Used Extensively

The division doesn't use the package extensively for permanent programming, Hurst explained, because current documentation standards are not compatible with what Score produces. Auditors want programs they can check and that won't be changed, even justifiably, without their knowledge, he said.

The local group doesn't go to Score user seminars or keep up with the latest updates of the package, but that's a conscious decision and not carelessness. They got what they wanted out of the package, and even a little more, so there's no justification in putting more money into the package, Hurst added.

Cuts Throughput Time in Half

Spooler Key to Profits for IBM 3-Based Bureau

KANSAS CITY, Mo. — A six-year-old service bureau here tripled main memory and extended the disk capacity of its IBM 3/10 last summer, but it was the addition of a spooling package that had the greatest impact on the operation, according to the firm's vice-president.

Bill Claypool explained that Keys to Profit has 30 clients. It specializes in custom services to provide financial reporting, inventory management, billing, payroll processing and other typical DP functions.

Until last June, the bureau's workload ran on a 16K 3/10 leased from IBM with a pair of IBM 5444 drives, a 200 line/min IBM 5203 printer, a card reader, magnetic tape drive and console. It was running two shifts a day and the system was nearing saturation, he said.

Half of the system's main memory was from Business Systems Technology, Inc. (BST), so when Keys to Profit decided to upgrade its printer to get one that would stand up to a 200 hour/mo workload, it again turned to BST.

Ultimately, much of the hardware the company now uses came from that same source. So did the spooling package.

Current Configuration

The current configuration is based on the same 3/10 CPU (now purchased from IBM), but with 48K of main memory including 40K from BST. The system also includes a pair of BST/45 disk drives, a BST 750 line/min printer, a tape drive, card reader and console typewriter.

"On the basis of the core in the old system and the printer, we purchased the drives, the additional core and the Spool/10 software package" from BST, Claypool said.

Spooler Redirects Output

Spooling software such as Spool/10 relieves an installation of tying its effective production rate to the relatively low speed of a printer. It does this by intercepting instructions that normally would put lines out on the printer and redirecting the output to intermediate storage on disk, at considerably faster speed than the printer could handle.

Once on disk, the output is sent to the printer as that device becomes available, but the transfer between the two peripherals is independent of the application program that is creating the output. Thus the program can keep going at its natural pace without waiting for the printer, and the printer can be kept moving at something close to its rated speed.

But the two operations are overlapped so there is none of the long delay that often marks operations geared to creation of a "print tape" and off-line production of the hard-copy reports.

The concept seems simple enough and has been implemented in a number of packages designed for the IBM 360/370 market, but Spool/10 appears to be the only spooler currently available for the 3/10.

IBM has a spool package for its 3/12, Claypool noted, but it works like the print tape operation: collecting all the printer output on disk before putting any of it out on the printer.

"Spool/10 is probably the biggest single factor in increasing throughput for our system," Claypool said, noting that when the hardware system was reconfigured the company had dropped its second shift, "but we were still pressed for time and it was inevitable that a second shift would be needed

(Continued on Page S/6)

'Fats' Evaluator Helps Weed Out Health Insurer's Degraded Tapes

By Don Leavitt
Of the CW Staff

DES MOINES, Iowa — There are some installations in which the quality of the magnetic tapes used is not extremely critical, especially if the primary use of the tapes is for archival files and day-to-day operations are disk-oriented.

American Republic Insurance Co., based here, is certainly disk-oriented. It has eight spindles of IBM 3350 and another half-dozen spindles of 3330 single-density space, all tied to a 3M-byte IBM 370/158, according to Chuck Kuebrich, vice-president in charge of the corporate information systems.

But American Republic is a health insurance carrier and it has three IBM 3420 tape drives, in addition to all the disks, and a library of some 12,000 tapes used for historical records. The nature of the business demands that the old records be readable whenever a claim is filed. Acceptance or refusal of the claim could depend on what's on the records, Kuebrich noted.

"We just don't like tape errors," he said recently.

The company has a programming/-analysis crew of about 40 and although Kuebrich could see the value to some sort of tape validation software, he couldn't spare any of the in-house staff for such a project. They are busy enough with claims payments, new business entry, underwriting, general policy service applications — the operations that keep the company going.

So he began to look around the marketplace. He wanted a way to get his tapes evaluated so he could throw away the bad ones before they caused any serious problems. There weren't very many packages available to do that kind of thing, but he found two or three.

He brought in the Fast Analysis of Tape Surfaces (Fats) package from Innovation Data Processing for a trial period, liked it and has been using it regularly for the past year and a half or two years.

"We cycle tapes through it on a scheduled basis," he said, but "if there are any questions any time about the quality of a tape, we'll run it through again regardless of schedule."

Two Approaches

The software provides two approaches to tape validation. The user can call for either a read or a write/read evaluation. The archives at Republic get the reading test; the scratch tapes are challenged by a write and then a read, Kuebrich explained.

He admitted he had no means of quantifying any benefits the company has gained through the use of Fats, but he obviously felt better about his library with the software in place. Republic just plain throws out any tape with five permanent or 10 temporary errors, he said.

The company also turned to Innovation for software to move the files from the disks to tape. The Fast Dump Restore (FDR) package was brought in-house at about the same time as Fats, he recalled.

(Continued on Page S/6)

On the Inside

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This special report was prepared under the direction of CW Associate Editor Don Leavitt.

Quartet of Utilities Provides Extraordinary Results

HOLYOKE, Mass. — Utilities often seem mundane packages, designed to perform particular functions needed by an application system or by a DP center for its own internal workings. Occasionally, however, a combination of utilities provides more benefit than seems possible when their purposes are considered separately.

That is what has occurred at the National Blank Book Co., a stationery manufacturer here, during the past 21 months, according to Edward Sigman, the company's manager of management information services.

Sigman has acquired a quartet of utility packages, each designed to cope with a specific problem he felt National Blank Book had. They've done their work, but in such complementary ways that the CPU — an IBM 370/135 under DOS/VS — and the program development staff work much better than before the packages were installed.

Two of the packages — Easyspace from Value Computing, Inc. and Tfast from Oxford Software Corp. — have optimized the company's use of its disk and tape space and, because of the way Easyspace works, it has helped to balance the load on the CPU as well, Sigman said.

The Librarian from Applied Data Research, Inc. — especially in its on-line facilities — has improved programmer productivity sharply in addition to controlling the source statement and other libraries. This package may yet be used to help with workload scheduling, although Sigman recognized that is not the product's purpose.

Power/VS is used to handle spooling of printer and other output and the Power/VS Cost and Performance Analyzer from IBM helps support job accounting and has been found to be "useful and a good value for the money." Sigman indicated he probably will get the CICS Cost and Performance Analyzer to account for his on-line operations.

The overall effect is that Sigman has incorporated a number of functions like those available under OS/VS, but done it in such a way that National Blank Book has continued to operate in the relatively less expensive DOS/VS environment.

Change in the Air

Sigman and a sense that the company had to change the way it was handling its DP operations apparently reached National Blank Book coincidentally, nearly two years ago. When he arrived, Sigman found the 370/135 with 96K of memory and IBM 2319 disks, operating under DOS/360 release 26 in single-thread mode.

The system was converted to IBM 3340 disk modules in about 60 days, but the staff faced a much bigger conversion at about the same time as it shifted to DOS/VS ("release 30, I think"): maximizing work space and partition use were problems that were completely new to them, Sigman explained.

The installation of additional main memory, acquired from Itel, brought the configuration up to its present 512K size. That was about when the company acquired Easyspace, Sigman recalled.

This package manages work space dynamically, relieving the user of the need to know where and how much space is available before a job is run. By the nature of the operation, it handles all work space allocations independent of the partitions that will use them.

When it started using Easyspace, the company had seven files with work space requirements. Now it has cut down the need for such work space allocations so that, except for occasional large sorts, it fills "little more than one pack," the manager said.

This not only saves space, but operational aggravation as well. Now "we can put a job in without having to worry about a conflict in work space and we don't have to worry about partitions because the facility dispatches work space as needed."

Since Easyspace has made more space available on the disks, more and more permanent resident files have been established. But, Sigman noted with some concern, "we're doing that to the point of blowing the hell out of what we have and it looks like we're going to have to upgrade."

Tfast was acquired about two months after Easyspace and has helped tape management to go well beyond what DOS/VS was designed to provide. With this first pair of packages "the machine manages itself a lot better and now works very nicely," he said.

He said he had no complaints about the products. Any time he'd had a question, the vendors had responded, he noted, adding almost apologetically, "I've never gone through a crisis with them, so I don't know how they would react professionally in that kind of situation."

Pioneer With Librarian

National Blank Book had The Librarian installed in September 1975 and in use in batch mode before it acquired CICS and began to move into on-line operations. Two weeks later, the company became one of the first users of Librarian's on-line facilities.

Sigman volunteered the adjectives "excellent" and "outstanding" when talking about the package. He said he didn't know how he could measure productivity, "but I have a gut feel that I'm getting 25% to 30% more out of my systems people" because of Librarian.

"I do see more code being generated. I've never tried to measure it," he reiterated, "but I do see more programs coming on the air faster than ever before." And he credits the on-line facilities as the kicker that provides the real pay-off.

The package has been working so well Sigman said people on his 13-man systems staff and on the operations crew "have been toying around" with the idea of using it to schedule jobs on a daily basis.

Since Librarian handles libraries of JCL procedures posted to disk, Sigman's reasoning goes, "we can put all our jobs under Librarian on a per day/per shift basis. Then my production supervisor can load the jobs by shift into the reader queue.

"During the shift, my operators would work at a CRT to see all the jobs in the queue and they could release them from 'hold' status as resources become available." On the other hand, high priority jobs not previously expected could be put into the queue without losing track of what was already there.

"It's a way to get around acquiring the software separately to set up a CRT console," Sigman said.

The company's workload is made up of over 1,000 programs, with almost 600M characters of data stored on-line. The big jobs are the ones directly related to manufacturing.

The use of the utilities has increased throughput and provided better scheduling than the company had before, even though neither of those benefits was necessarily listed by the vendors of the products, he said.

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Utilities Ease Firm's Conversion to Different Net

By Don Leavitt
Of the CW Staff

ROXBORO, N.C. — Crown Aluminum Corp., based here but with distribution centers scattered throughout the Eastern U.S., is in the midst of converting from an IBM 3 with Sycor terminals to a Honeywell 6240 with Datapoint terminals.

It would be difficult to find a person more enthusiastic than Crown's DP manager, Peter Thacher, when he is talking about the utilities he has to help him in this chore.

"You want to talk about precompilers?" he asked. "I have one here that runs on my Datapoint gear. It writes programs for you." The package is a regular Datapoint product, primarily used for data entry.

When a user brings this system on a terminal, "it asks you to lay out the CRT screen format you expect to use. Once you lay out the screen, it asks what edit codes apply to each field, what you expect to do with each and where the data comes from."

This means that the user not only can identify the type of data—alpha, numeric or mixed—acceptable to any given field, Thacher continued, but he can show that it should come, for example, from a lookup against an Isam file. Target locations for the data once validated are also specified by the user, he said.

In any case, once the user has responded to all the prompting from the system, it generates a source program, compiles it and runs.

That much is for data entry, but there are other parts to the system, the manager said.

One other portion allows the user to print from the file created in the entry validation for such things as edit lists. Printouts produced under this facility can include level breaks, subtotals and grand totals, Thacher noted.

Crown's DP staff is made up of Thacher, a programmer, a programmer trainee, an operations supervisor, two data entry clerks and an operator. With that small a group, he can probably be forgiven for calling the software "fantastic," adding "[Datapoint's] apparently got a guy [in San Antonio] who wears sandals, has long hair and is definitely unreal."

The company produces siding, gutters and downspouts for houses and turnaround time on orders is important to its operations. The Datapoints are being placed at distribution centers in Syracuse, N.Y.; Cincinnati; Detroit; Washington, D.C.; Memphis, Tenn.; and Atlanta. In addition to data entry, they will produce invoices and maintain inventory at the local level, Thacher said.

While the Datapoint package helps Crown get clean data into the system and out at the terminals, the staff has also found considerable help at the Honeywell end of their still-developing configuration.

In place of a large IBM 3, Crown now has a Honeywell 6240 at its manufacturing plant here, with a 6260 on order and expected in September. The decision to change vendors was based on economics: the Honeywell upgrade costs about $10/mo more than the IBM 3; an IBM 370/125 or 135 would have cost around $6,000/mo, or about 50% more than the 3.

Thacher figured that converting to the 370 would take about two years and cost $10,000. The shift to the 6240 took about four months and involved about 400 programs.

Crown's staff handled much of the work with some help from Honeywell. "Their work wasn't bad," he said. "They put their effort into it. There's no question about that."

Ironically, one of the problems Crown encountered was that Honeywell's software is "much more powerful" than IBM's and it was difficult to learn how to use it because the documentation "wasn't all that swift."

As an example of the problem, he noted that IBM's 3 "doesn't really care" what the sign is on a numeric field, or for that matter, on an Isam key field.

Honeywell "does care," he said, and if its software doesn't find an exact match to the value it expected in a key, "there's no hit." So he and his crew had to put "a bunch of bits and bytes and nibbles" into their coding to make field sizes come out right.

While the demanding nature of Honeywell's instruction set has been troublesome during conversion, Thacher obviously likes it. It will catch situations leading to data exceptions and "like the decent machine it is" leave the DPers with an assurance that any data produced by it is good.

With the IBM 3, he said, "you never knew if what you got out was any good and so you had to maintain all sorts of edit checks" where none really should be needed.

Library System

Also important to his plans for program development is a "very good" library system maintained by the Honeywell operating system. The library supports the COPY function so Thacher has his programmer trainee writing all sorts of COPY statements for page overflow routines, report headings, file layouts and "anything else we might use regularly."

That will reduce some of the user's coding time, but Thacher also expects to use a Cobol preprocessor—CBLShort from General Electronics—as soon as he has time to adapt it to the Honeywell environment.

Right now the package is IBM-oriented and Thacher will start his adaptation of it by suppressing the JCL it generates before the source program output. But he'll also have to reach in and change, for example, IBM-sanctioned double quotes to Honeywell-accepted single quotes.

The manager used CBLShort at an IBM 360/30 installation before he joined Crown and he's looking forward to what it will do for him once the adaptation is done.

Certainly the shorthand capabilities—accepting P for PICTURE, F for FROM and C for COMPUTE, for example—is nice, he acknowledged. But the system's tolerance for free-form input and its ability to produce complete Cobol statements in well-structured format is even more important, he said.

That combination means that life is easier for the programmer, who doesn't have to find coding sheets or write as much whatever paper is used, and for the keypunch operator who doesn't have as much to punch.

Any lessening of work is a potential lessening of errors, he noted, adding that, at the other end of the process, the regularly structured format of the source programs produced by CBLShort should make debugging and later maintenance easier too.

Putting Honeywell's library facilities together with CBLShort's should make programming "very easy" for the crew at Crown, the manager concluded hopefully.

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Data Volume Crucial

DASD Management Keeps Off-Line Data 'Active'

SAN FRANCISCO—In almost any time-sharing environment one of the major problems is controlling an almost runaway situation in direct access storage device (DASD) space management. This is especially true if yours is a test system which is used for all development work for a major U.S. bank.

More than two years ago, Wells Fargo Bank's DP department found it was faced with a staggering amount of private disk mounts per shift and the time-sharing response was suffering. It became obvious the bank would have to reduce or eliminate private disk mounts while maintaining ready access to data then on off-line disks.

The objective was to move "useful" data on 210 off-line 2314 disk packs to a minimum number of on-line 3330-11 packs. At the same time, the staff was faced with two major problems. The first was the sheer volume of data on the 2314s which had been developed; the second was the lack of an easy means of identifying the "useful" data.

At first, the department considered moving the data to on-line 3330 packs manually over a six-month period. This would have involved consulting with more than 300 users and limiting the transferred 2314 files to a bare minimum.

It was apparent from the start that this alternative was not viable since, first of all, it would take too long. In addition, considerable time would be consumed in going over data sets with the users.

"Because of these overpowering problems," Clement Yang, systems analyst with Allan Consulting of Palo Alto, Calif. and formerly systems programmer with Wells Fargo, said, "we had to locate an archival system with a proven track record to handle the job. That was when we chose ASM2 from Cambridge Systems Group."

Concerning the magnitude of the system, Yang noted that at the time the bank was running an IBM 370/158 with VS2, release 2. This 2M-byte machine had eight tape drives and the disk drives mentioned above. Since the disk system had grown so rapidly in recent years and there was no sign of a decreasing usage of the system, it was apparent the bank needed a data set archival system that would off-load disk data sets to tape.

Using ASM2, the staff archived all the data sets on the 210 2314 packs to tapes. They also told users that jobs calling for 2314s would now be canceled since the 2314s were being removed.

The timetable for the conversion was 50 packs a weekend and 60 packs on the last weekend. The packs were split by development application so that each application team was affected only one weekend.

As a result, the DP group was able to convert all 210 2314 packs to archive tapes in four weekends using only one systems programmer.

"Rather than make a decision on what data sets should be moved to on-line disk packs,"Yang commented, "we archived everything to tape and then as users needed the data it was reactivated. That information which was most needed was kept on the disk packs, and that which was used less frequently was reloaded, used and returned to tape."

Asked how much of the information really was so active that it must be on-line, Yang noted that less than 10% of the data sets were reloaded to the 3330s. The net result was that Well's Fargo's DASD environment was able to transform 210 off-line 2314s into less than four on-line 3330-11s. "In addition, because of the reload capabilities in ASM2, users find the archived data is still highly active and accessible," he stated.

Since the conversion to the 10 3330s, Wells Fargo has recently converted to seven 3350 disk packs. "As you can see," Yang commented, "during the two-year period the bank has increased the amount of disk space only slightly. It has kept the hardware costs down to a minimum and still has not impacted the users."

Initiator Handles Reloads

He added that to achieve this active archival state, the DP department has one initiator which is classified "R" for "reload only." When a user needs some of his archived data, all he does is request a reload and, in a very short period, the information is in the system.

If there is a backup of reloads and the user needs the information more quickly, the department simply gives his work higher priority so he can get data more quickly. "This happens very infrequently, though," Yang noted. "Generally, the initiator is inactive."

Concerning today's operation, Yang said ASM2 is run daily. It records such important monitoring information as a data set's last access date, total use count and time of day and job name/user ID at the last data set modification. With this information, the product monitors data set usage throughout the system and, at the end of 32 days, automatically migrates "inactive" data sets to off-line tape.

"In this way," he explained, "there is a maximum amount of free disk space with only the 'active' data remaining on-line."

He added that Wells Fargo had selected the 32-day cutoff period and, since disk space was still too tight, were now in the process of reevaluating what the archival cutoff date should be.

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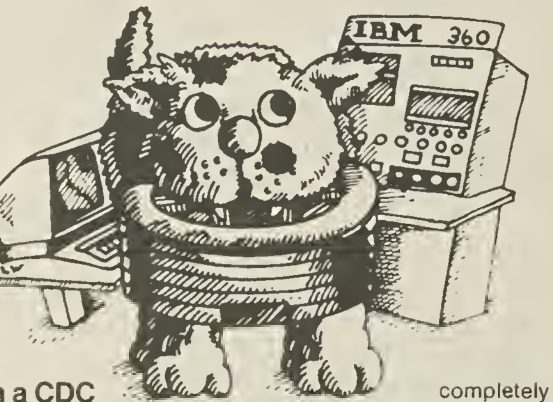

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Spooler Key to Increased Profits For IBM 3-Based Service Firm

(Continued from Page S/2)

again."

Once Spool/10 was installed "our overall throughput was cut by one-fourth, and we won't need a second shift until our workload greatly increases. With the upgraded system, we have dropped from 200 hour/mo to 130 hours," he continued.

For some jobs, throughput time has been cut by more than 50%, he claimed. A large job that used to take two hours and 20 minutes to run takes only 45 minutes with Spool/10 and the updated hardware.

That particular job is a series of programs that require some manipulations and the printing of several short reports. With the spooler in place, the system actually gets through the entire job stream before the first report is completely printed, Claypool said.

With that kind of processing-I/O overlap, "we can enter another job stream while the printer is still working on the first one," he added.

Job Stream Scheduling

Claypool claimed that properly setting up the job stream gives the best, most efficient use of Spool/10 and, in most cases, can make a 40% to 50% decrease in throughput time.

"Jobs that require a lot of sorting can really be cut down with the spooler," he said. "Arrange the job stream so the larger print jobs run first. By doing this, the sorts and programs that follow are executed while the printer is still printing the first job," he noted.

"If a forms change is required, the system can keep running. If another peripheral needs attention, the printer can keep running. This allows operation with minimum downtime," he added.

Claypool said he also runs Spool/10 as a precaution against paper jams, even if he won't save throughput time if things go smoothly. By capturing print line images on disk, the utility allows the user to run extra copies of a report or to pick up printing in the middle of a run.

Thus, if Claypool has a paper jam, he restarts the printing at the top of the page on which the jam occurred. He doesn't have to rerun the entire program that generated the report.

'The Greatest Thing'

Clearly a disciple of the new approach to printing, he said, "In my opinion, anyone with a 3/10 who is pushed for time would be foolish not to consider spooling. It's the greatest thing that's happened to our system."

Although he sees things that way now, it wasn't always so. Last spring he and Keys to Profit president Doris Sawyer had considered converting to an IBM 3/12. Ultimately they decided to upgrade the 3/10 because switching to the 3/12 would have cost them all the purchase credits they had accumulated over the years of leasing the 3/10.

Other factors played a part in the decision, he added, citing the large capacity of the 3348 disk modules that would have been used on the 12 as a disadvantage in the service bureau environment.

"The 45 packs [from BST] allow us to assign individual packs to each customer and still run a good backup system on a single tape," Claypool said. That way it's more efficient and there is minimal danger of destroying one customer's files by overrunning the extents assigned to another during his processing.

Evaluator Eliminates Bad Tapes

(Continued from Page S/2)

Even though Republic does not normally use the "restore" portion of FDR to bring files back down to disk, Kuebrich said he thought the package was "very appropriate" for his needs. The archiving has to be handled on a regular basis and cannot be dependent on whether an operator or a shift manager remembers to do the job.

"There's nothing in the IBM utilities that will compete with FDR," he commented.

Even if the files aren't brought down from tape to disk for regular processing, individual tapes are read as claims are evaluated. This is a minor part of the company's DP operation. "We may read one tape a week," but that tape has to be good when it is needed.

And the use of Fats gives him the assurance that the record will in fact be good when it is needed.

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WANG

'Report Writer' Reduces Coding, Debugging Tasks

By William R. Englander
Special to Computerworld

Many installations shy away from the Cobol Report Writer feature for "no particular reason." This is no doubt due, in part, to the fact that Cobol compiler implementors document it in reference format rather than in tutorial mode. But Cobol users should try Report Writer and gain enough familiarity with it to be able to use it in conjunction with the reference-style manuals.

Having done this, they should evaluate it in terms of their own development and computing costs, levels of programmer experience, etc. Many will find it to be feasible, at least for simple reports and for reports that are expected to be changed often.

Like any unfamiliar technique, Report Writer takes a couple of programs to get used to, but it is worth the effort. There are lots of report generator packages available. Try the free one first.

Getting Down to Coding

Report Writer replaces most of the report-formatting procedural statements with parameter statements in the Data Division. This typically results in less coding and debugging.

The examples below assume the following input file description

```
FD  ACCDUNT-FILE
    LABEL RECORDS STANDARD.
01  ACCOUNT-RECORD.
    03  AR-BRANCH        PIC X(4).
    03  AR-ACCOUNT       PIC X(8).
    03  AR-NAME          PIC X(25).
    03  AR-SALANCE       PICS9(5)V99.
```

To simply list the fields in the input file with no headings or totals:

- Place a REPORT SECTION after the WORKING STORAGE SECTION containing a report description (RD) entry as follows:

```
REPDRT SECTION.
RD  ACCDUNT-LIST
    PAGE 60 LINES
    FIRST DETAIL 6.
01  ACCDUNT-LINE
    TYPE DETAIL
    LINE PLUS 2.
    03  COLUMN 01 PIC X(4)          SDURCE AR-SRANCH.
    03  COLUMN 05 PIC X             VALUE '-'.
    03  COLUMN 06 PIC X(8)          SDURCE AR-ACCDUNT
    03  COLUMN 20 PIC X(25)         SOURCE AR-NAME
    03  COLUMN 50 PIC $$$,$$9.99-   SOURCE AR-SALANCE.
```

ACCOUNT-LIST is a name designated by the programmer for this report. It will be referenced in the FD for the printer file to which the report will be written. It will also be referenced in the INITIATE and TERMINATE statements for this report.

PAGE 60 LINES indicates a page depth of 60 lines.

FIRST DETAIL 6 indicates that the first detail line on each page should be printed on line six.

ACCOUNT-LINE is a name designated by the programmer for the detail line being defined. It will be referenced in the GENERATE statement for that line. It takes on more meaning in report definitions containing more than one detail line.

TYPE DETAIL indicates a detail line is being defined.

LINE PLUS 2 indicates double spacing.

The individual report fields are defined with starting print position (COLUMN), format (PIC) and field from which the item is to be obtained (SOURCE) or a literal value (VALUE).

- Place a REPORT clause in the printer file description indicating the name of the Report Description (ACCOUNT-LIST) and omit the record description as follows:

```
FD  PRINTER-FILE
    LASEL RECORDS DMITTED
    REPDRT ACCDUNT-LIST.
```

- Place statements in the Procedure Division to initiate the report, generate report lines and terminate the report as follows:

```
INITIATE ACCDUNT-LIST.  (RD name)
                 .
                 .
                 .
GENERATE   ACCOUNT-LINE.  (detail  line
name)
                 .
                 .
                 .
TERMINATE ACCDUNT-LIST.  (RD name)
```

Page headings and totals can be produced by adding their descriptions to the Report Description. No changes to procedural code are required — hence little or no additional debugging is required. To produce page headings in the sample report, add them to the Report Description as shown in Figure 1.

TYPE PAGE HEADING indicates that heading lines are being defined. No name is needed for the heading line(s) as they are printed automatically (not referenced by a GENERATE statement).

LINE 1 indicates that the group of fields that follows is to be printed on line one of each page.

The source for the right-most field on the top line is PAGE-COUNTER. This is a special register maintained by the Report Writer feature which contains the current page number.

LINE 4 indicates that the second group of heading fields is to be printed on line four of each page.

To produce subtotals by branch and a final total in the sample report, add them to the Report Description as in Figure 2.

The CONTROLS clause indicates which fields should cause control breaks when their values change. In this case it has been indicated that totals are desired when branch number (AR-BRANCH) changes and at the end of the report (FINAL).

Descriptions of a branch total line and a grand total line have also been added. TYPE CONTROL FOOTING indicates that a total line is defined and that it is to be printed when the value of the data name provided changes.

The SUM clause is used rather than SOURCE to indicate that the SUM of the data name indicated is desired. The sum of the balances in the branch total line was given a data name, BRANCH-TOTAL, so that it could be referenced in the grand total line.

LINE NEXT PAGE indicates that the grand total is to appear on the page following the last branch total.

Englander is an instructor at San Diego State University.

```
REPORT SECTION.
RD  ACCOUNT-LIST
    PAGE 60 LINES
    FIRST DETAIL 6.
·01 TYPE PAGE HEADING.
    03  LINE 1.
        05  COLUMN 01     PIC  X(15)     VALUE 'ACCOUNT LISTING'.
        05  COLUMN 53     PIC  X(4)      VALUE 'PAGE'.
        05  COLUMN 58     PIC  Z(3)      SOURCE PAGE-COUNTER.
    03  LINE 4.
        05  COLUMN 01     PIC  X(14)     VALUE 'BRANCH ACCOUNT'.
        05  COLUMN 25     PIC  X(4)      VALUE 'NAME'.
        05  COLUMN 54     PIC  X(7)      VALUE 'BALANCE'.
01  ACCOUNT-LINE
    TYPE DETAIL
    LINE PLUS 2.
    03  COLUMN 01         PIC  X(4)      SOURCE AR-BRANCH.
    03  COLUMN 05         PIC  X.        VALUE '-'.
    03  COLUMN 06         PIC  X(8)      SOURCE AR-ACCOUNT.
    03  COLUMN 20         PIC  X(25)     SOURCE AR-NAME.
    03  COLUMN 50         PIC  $$$,$$9.99-
                                         SOURCE AR-BALANCE.
```

Figure 1. To produce page headings in the sample report, add them to the report description.

```
REPORT SECTION.
RD  ACCOUNT-LIST
    CONTROLS FINAL AR-BRANCH
    PAGE 60 LINES
    FIRST DETAIL 6.
01  TYPE PAGE HEADING.
    03  LINE 1.
        05  COLUMN 01     PIC  X(15)     VALUE 'ACCOUNT LISTING'.
        05  COLUMN 53     PIC  X(4)      VALUE 'PAGE'.
        05  COLUMN 58     PIC  Z(3)      SOURCE PAGE-COUNTER.
    03  LINE 4.
        05  COLUMN 01     PIC  X(14)     VALUE 'BRANCH ACCOUNT'.
        05  COLUMN 25     PIC  X(4)      VALUE 'NAME'.
        05  COLUMN 54     PIC  X(7)      VALUE 'BALANCE'.
01  ACCOUNT-LINE
    TYPE DETAIL
    LINE PLUS 2.
    03  COLUMN 01         PIC  X(4)      SOURCE AR-BRANCH.
    03  COLUMN 05         PIC  X         VALUE '-'.
    03  COLUMN 06         PIC  X(8)      SOURCE AR-ACCOUNT.
    03  COLUMN 20         PIC  X(25)     SOURCE AR-NAME.
    03  COLUMN 50         PIC  $$$,$$9.99-
                                         SOURCE AR-BALANCE.
01  TYPE CONTROL FOOTING AR-BRANCH
    LINE PLUS 2.
    03  COLUMN 20         PIC  X(12)     VALUE 'BRANCH TOTAL'.
    03  BRANCH-TOTAL
        COLUMN 47         PIC  $$,$$$,$$9.99-
                                         SUM AR-BALANCE.
01  TYPE CONTROL FOOTING FINAL
    LINE NEXT PAGE.
    03  COLUMN 20         PIC  X(11)     VALUE 'GRAND TOTAL'.
    03  COLUMN 46         PIC  $$$,$$$,$$9.99-
                                         SUM BRANCH-TOTAL.
```

Figure 2. To produce subtotals by branch and a final total in the sample report, add them to the report description.

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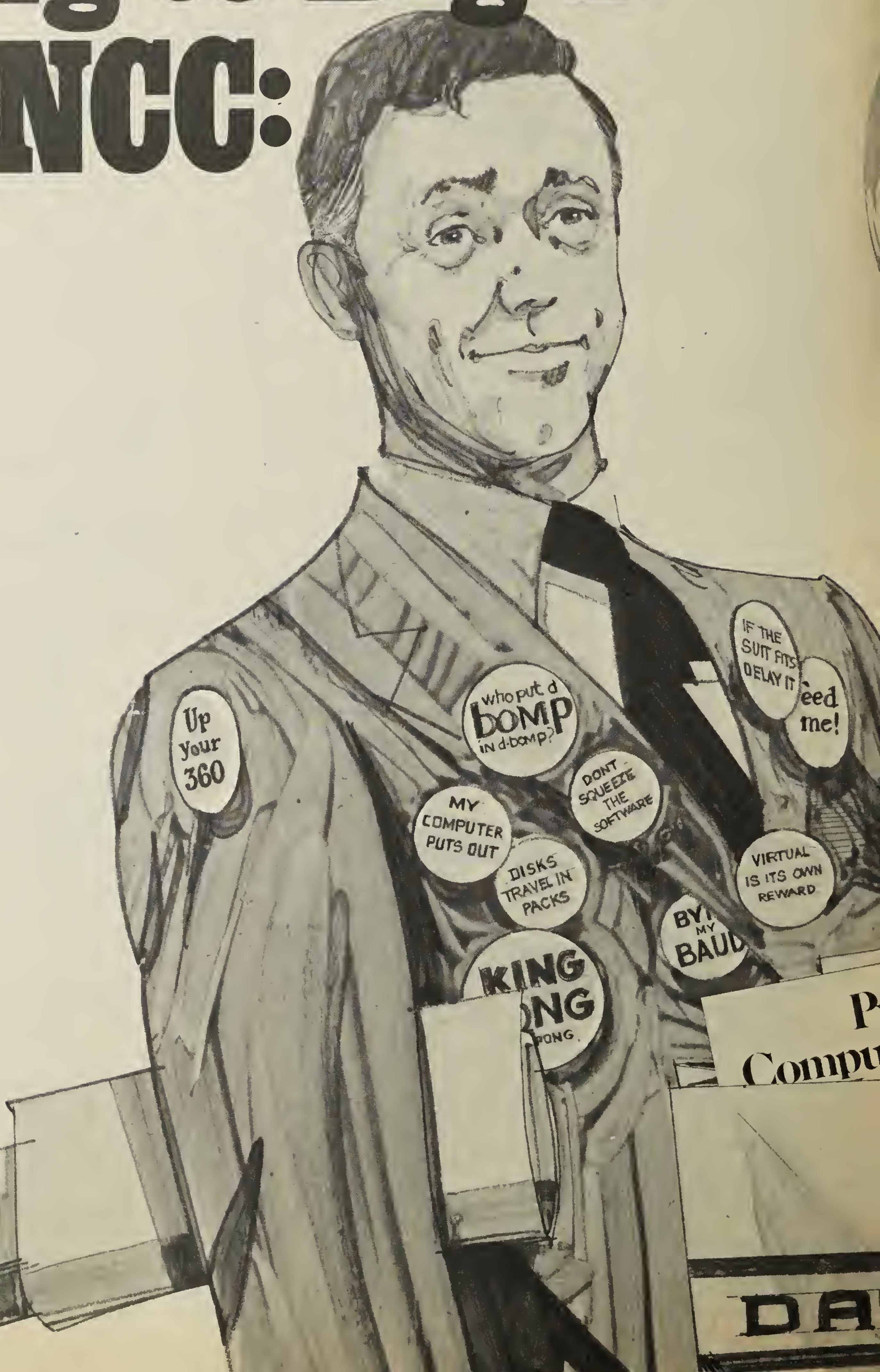
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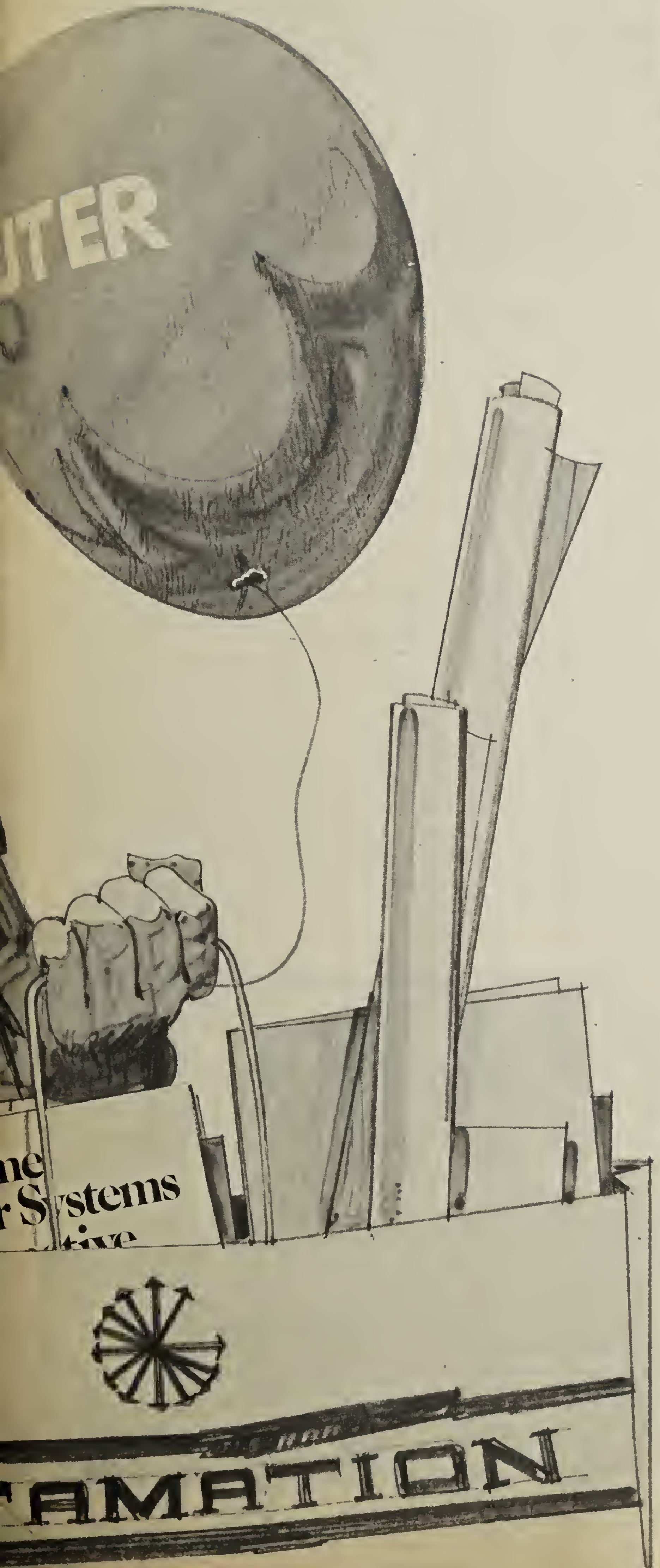

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Cobol Precompilers Seen Lacking in User Popularity

By Robert T. Grauer
And Marshal A. Crawford
Special to Computerworld

Almost since the inception of Cobol, detractors have complained that its advantage of self-documentation is entirely offset by its verbosity. Today, however, the problem of writer's cramp has effectively been eliminated through the advent of Cobol preprocessors.

But with a great many products of this type on the market, it remains a puzzle — to us, at least — why they have not caught on to a greater degree. Perhaps the number and variety of the products is part of the problem.

For now we will use the term precompiler and restrict our discussion to those products whose output is pure Cobol. Simply stated, a Cobol precompiler provides a quick way to code Cobol. It accepts abbreviations and shortcuts as input and uses the computer to expand the shorthand program into a complete Cobol program.

Savings vary according to the particular product but results of 50% or higher are commonly achieved by the better ones.

Four products can illustrate the capabilities of a sophisticated precompiler: CL*IV from Informatics, Metacobol from Applied Data Research, Inc., Splice from Software Module Marketing and Work Ten from NCI.

Of the four, Metacobol is the best known and most successful. In absolute terms it has done well — over $2 million in sales and more than 300 installations. In relative terms, however, it hasn't even dented the market when one considers the total number of Cobol shops.

Myths Debunked

It seems almost traditional to raise certain arguments against precompilers. But if the reasoning behind each argument is considered and the facilities available are understood, the arguments can be refuted.

Objection 1: A precompiler does not accomplish anything significant. Any of the four vendors claim a bottom line reduction in coding of at least 50%, so a precompiler must do something. Savings result from a variety of techniques. Of principal interest are abbreviations, relative addressing and logic generation.

Abbreviations are of two general types — system-defined and user-defined. System-defined abbreviations are established for both the Procedure and Data Divisions: e.g., "MZ" for "MOVE ZEROS TO" or "F" for "FILLER." These abbreviations do not reduce the number of statements per se, but significantly affect the number of "pencil strokes" and, after a brief learning period, become second nature.

User-defined abbreviations are set by individual programmers and are most often applied to data names: "FEDWH" might be designated as an abbreviation for "FEDERAL-WITHHOLDING-TAX." The advantage here is obvious. The programmer uses an abbreviated but mnemonically significant form which is later expanded to a truly meaningful data name that substantially enhances documentation.

Abbreviations are the least sophisticated technique of precompilers, but their effects are dramatic and immediate.

Relative addressing allows the programmer to code the greater part of the Data Division directly in the Procedure Division. Since the Data Division tends to be the most cumbersome to code, relative addressing eliminates much of the tedium of Cobol coding.

The technique generates Cobol record layouts by referencing only the relevant positions of that record. It requires an 01 level record name in the Data Division, after which pertinent Procedure Division references are to that record name, followed by the desired positions within the record.

There are various subtleties associated with relating addressing. The type of PICTURE clause associated with an entry is indicated, for example, by appending a one-letter suffix to the relative address entry: e.g., "S" for signed numeric, "B" for Computational (binary). Omission of the suffix defaults to alphanumeric, i.e. "X."

Two immediate objections to relative addressing are that "CARD-30-40-S" is cumbersome to code and has no mnemonic significance. Both points are valid but easily countered. Ease of coding is established by adding an "E" (for EQUATE) and a mnemonic name (such as "FEDWH") to the intial use of a particular relative addressing entry, after which the programmer has a normal abbreviation to use.

Three of the four products mentioned earlier provide a logic generation capability. Essentially, they define a set of new Cobol verbs each of which is expanded by the precompiler into a series of Procedure Division statements, providing a macro expansion. Typically these macros are aimed at the mechanical, repetitive functions of DP: e.g., matching files, counting lines, heading pages.

Objection 2: Cobol precompilers are not applicable to maintenance programs. Whether significant savings can be achieved in maintenance programs is dependent on the extent of modifications. However, most precompilers are designed with a second objective: increasing the legibility of both new and existing programs.

This includes formatting for readability, with such things as alignment of field names, PICTURE, USAGE and VALUE clauses on predetermined columns; sequencing paragraph names by a single command; and realigning ELSE under the relevant IF as the compiler, and not the programmer, interprets a compound conditional.

A precompiler with such documentation capability significantly protects the investment in software by facilitating the tasks of both the maintenance and developmental programmer.

Worth the Cost?

Objections 3, 4 and 5: Precompilers represent something new to learn, increase machine utilization and are simply not worth the cost. Education is minimal because a precompiler is not really a new language, but a faster way to code Cobol. The four vendors collectively say education should not require more than a few days, or even a few hours.

A truly compatible precompiler should accept any valid Cobol statement, use Cobol coding forms and column conventions and parallel Cobol logic.

As to machine overhead, the "precompile" is indeed a separate job step requiring additional machine time, but we don't believe this increases machine utilization in the final analysis. The fact is, most programmers find they require fewer runs to reach a clean compile and, further, their expanded Cobol programs contain fewer bugs than ones coded conventionally.

Cost savings are substantial. Aside from obvious, but hard to quantify, increases in

(Continued on Page S/12)

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Datacom DB, CIM	8	3.3	3.4	3.0	3.4	2.3	3.4	3.1
DBOMP, IBM	48	3.0	2.6	2.4	2.7	2.5	2.7	2.4
DL/1, IBM	29	2.6	2.4	2.3	2.4	2.4	2.5	2.6
DMS-II, Burroughs	5	3.8	4.0	3.6	3.6	2.8	3.0	3.2
GIS, IBM	7	2.4	2.1	2.1	3.0	2.7	2.6	2.3
IDMS, Cullinane	**17**	**3.8**	**3.3**	**3.4**	**3.6**	**3.0**	**3.6**	**3.5**
IMAGE, Hewlett-Packard	11	3.6	3.3	3.7	3.2	2.8	2.9	2.7
IMS, IBM	33	2.9	2.4	2.2	2.5	2.8	2.8	2.9
INQUIRE, Infodata	6	3.2	2.2	2.7	3.0	2.5	2.8	2.6
Model 204, C.C.A.	3	3.7	3.3	3.3	3.3	2.7	3.3	2.7
SYSTEM 2000, MRI Systems	21	3.0	2.3	2.9	3.5	2.4	2.7	2.1
TOTAL, Cincom Systems	113	3.5	3.1	3.4	3.4	2.8	3.0	2.8

**All weighted averages are based on a scale of 4.0 for Excellent*

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'Slick' Library Package Exceeds Firm's Expectations

By Brian Fillebrown
Special to Computerworld

BOSTON — Until last June, Fiduciary Trust Co. had been using a sequential disk library system acquired as part of an application package. We had been dissatisfied with the library, however, for several years and for several reasons: access time was very slow (five minutes for programs near the end of the file); creating multiple copies of the same program was difficult; security of individual programs was nonexistent; and lack of data compression meant continually increasing the space assigned to the library.

Five library packages were evaluated as replacements. The Slick package from National Computing Industries (NCI) was selected primarily because the purchase price of $2,500 was about half the price of the other two packages that passed our selection criteria.

The installation of the package was done by our staff in about 35 minutes of machine time. The package included a program to convert an IBM source statement library directly to the Slick format, but because we used a different library we were forced to write our own conversion program. The program was completed in two days and the entire library was converted in less than four hours.

Training Not Included

The Slick library purchase price does not include training, but the user's manual covering programmer functions is clear enough such that all the programmers felt comfortable using the package about one day after a one-hour training class given by the programming manager.

The documentation concerning the management functions was not as clear and contained several JCL assignment errors. The NCI people were very cooperative and quickly corrected the documentation.

The package performed better than we expected concerning space allocation, access time, ease of use, backup and security. In addition, Slick enabled Fiduciary Trust to:

- Eliminate the 1442 card punch from its configuration.
- Store operation runbooks, program problem reports and program documentation on the libarary.
- Quickly change disk file sizes for production jobs by storing JCL on the library using the search/replace command.
- Reduce the number of 3348 data modules on-site because of the compression feature.

Punched Card Output

The only application that produced punched card output was the Strata auditing package used by the company's auditors. Each Strata program would punch several hundred cards, the auditors would make changes to the deck and run the job.

The Strata assignments were changed to punch card images onto a tape, and the tape was then used to catalog the program to the auditor's private Slick library. The auditor would then make his changes on the Slick library, and the program was retrieved from the library and executed. This process eliminated the 1442 card punch at a yearly cost savings of $5,000.

Documentation Problems

Programmers have always been resistant to writing and maintaining program and system documentation. Also, in many companies there are problems in getting documentation typed quickly and efficiently.

Since programmers are geared toward coding, we had runbooks, program problem reports and program documentation coded, keypunched and added to the Slick library. The result has been better documentation that is much easier to maintain than typed documents. The next step in this effort is to add user manuals to the Slick library.

The maintenance of JCL procedures has always been a problem especially when expanding file sizes required updates to many of our 150 procedures. In the past, it had taken approximately two weeks of the systems programmer's time to change and test the procedures. All of the JCL procedures were added to the Slick library and now, using the search/replace command, the JCL changes are accomplished in one hour with minimal testing requirements.

The data compression was great enough to eliminate one 3348 data module at a yearly savings of $840. The Slick library package has paid for itself several times in less than one year of use.

Fillebrown is the manager of systems and programming at Fiduciary Trust Co.

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Cobol Compilers Seen Lacking in Popularity

(Continued from Page S/10)

programmer productivity, a precompiler pays for itself in keypunching alone.

Assume for illustration, a Cobol shop with 10 programmers, associated keypunch costs of 10 cent/card and a productivity of 300 Cobol statements coded per programmer per week. If a precompiler is adopted and produces 50% savings, then in effect only 150 (instead of 300) statements are coded and punched for each programmer.

That is equivalent to a savings of 150 cards or $15/week per programmer; $150 per week per staff of 10 programmers; or $7,500 per year.

The $7,500 figure — more than the cost of some precompilers — increases with the number of programmers and their productivity rate.

Grauer is an assistant professor at City University of New York; Crawford is a software consultant for CGA Computer Associates and Personnelmetrics, Inc. They are the developers of Splice.

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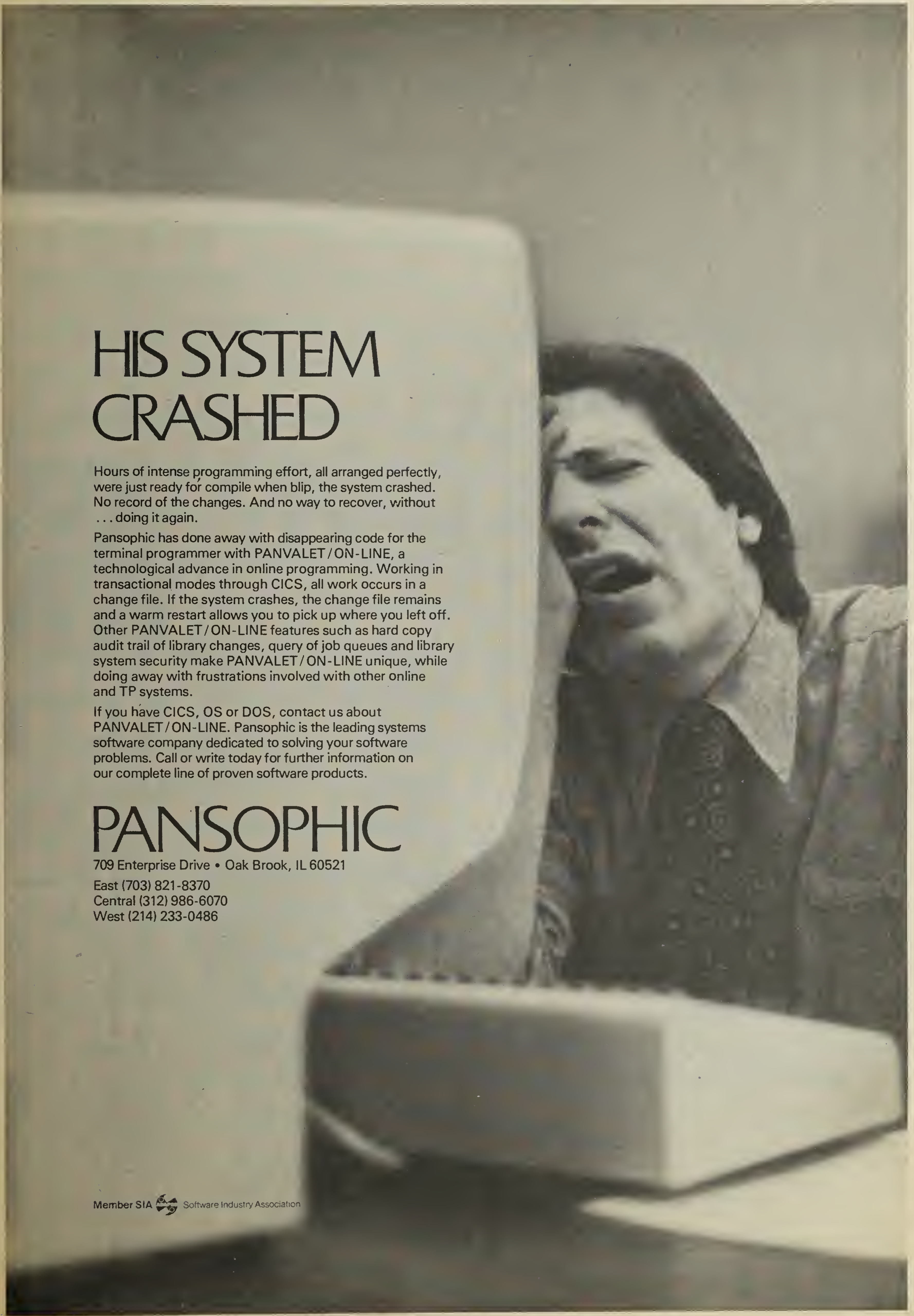

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From IBM 370/135 to 360/40

Packages Key Factors in Firm's Successful Conversion

By **Don Levitt**
Of the CW Staff

LOS ANGELES — The past two years have seen Piedmont Management Co. (PMC) convert its DP operation from an IBM 370/135 running under DOS/VS to a 360/40 running under DOS, while continuing its support of the company's diversified financial services.

Key factors in the success of the conversion, beyond the skill and patience of PMC's eight-man systems and programming team, have been two proprietary software packages: DYL-260 from Dylakor Software Systems, Inc. and The Librarian from Applied Data Research, Inc.

A third package, the Disk Utility System from Westinghouse, is also in place and in use, but played no part in the conversion. This utility is so transparent that PMC is using the same version now as it was under VS although some JCL changes were needed, according to DP manager Fred Willis.

Clearly Inappropriate

The 135 being used when Willis joined PMC two years ago was "clearly inappropriate" for the company's needs and the move to the 40 was lateral — neither upgrade nor cutback — in terms of usable capacity. The company runs the 360 three shifts a day, five days a week but with fewer people than it used to run the 370 two shifts five days a week.

Willis had been involved in Beta-testing and use of DYL-260 in a job he had before PMC so he was familiar with its capabilities and the support he could expect from Dylakor. Therefore, as he noted recently, there was no long involved evaluation before he acquired the package for Piedmont.

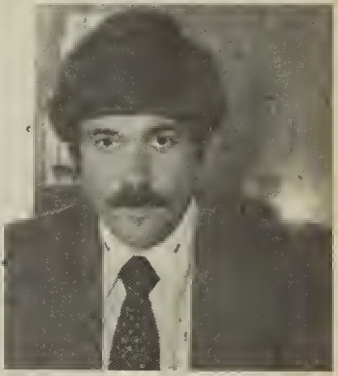
At first, the members of the PMC programming staff were the only users of DYL-260. The professionals used the Dylakor software in several "interesting ways," taking full advantage of the linkage capabilities, according to Willis.

Overlay Analysis

Analysis of a complex overlay required during the conversion to DOS from the virtual environment was one of the tasks the staff handled using DYL-260. So was the reading of BDAM files sequentially, as well as support for the conversion of "a multiplicity" of IBM source statement libraries to the control of The Librarian, Willis said.

The shift to ADR's Librarian was coincidental but also complementary to the move to the 40.

Willis estimated he and his staff had over 1 million lines of code tucked away in private source libraries "all over the place. That's a heap of code" and it just wouldn't fit on one disk, he said, explaining the earlier approach.



Fred Willis

Because of copied code, PMC had duplication which had to be eliminated. DYL-260 was "invaluable" in this situation, the manager added. The package, plus some user-written routines, was used to identify the duplications, to access directories and to do "an awful lot of other things" to help the conversion along.

'Programming Kit' Devised

Although several attempts were made by Willis and others to teach select user personnel the coding of simple applications — after all, the package is touted as a tool for nonprogrammers — it was only after the introduction of a data definition language (through the so-called L parameter) that Willis and his crew were able to successfully provide the users with direct use of the package.

Once the users could name their fields, a member of the programming staff made the L parameter the basis of a "programming kit" for the non-DPers and they have begun to reap several benefits: information comes out of the computer the way they want it; very little programmer involvement is necessary; and as the user's skill and confidence grows, he can satisfy his information needs on a more timely basis.

That, in turn, has freed the professional programmers and systems people to perform more substantial DP tasks, Willis noted. And they are still using DYL-260 heavily in their day-to-day work.

(Continued on Page S/16)

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'Roscoe' Extends DP Access for Life Insurance Firm

ATLANTA — The Life Insurance Co. of Georgia has 129 offices in 11 Southeastern states, with more than 4,000 employees servicing insureds who hold more than $5 billion worth of life insurance. To help manage the many facets of this large, widespread business, employees are using terminals located in key departments throughout the company to access more than 3,400 programs.

Programmers use the terminals for software development and the operations department keeps track of computer scheduling. The general accounting department enters accounts receivable and other data, while the comptroller's department monitors on-the-spot financial information. The terminals are even used by the investment department to follow daily stock transactions.

All this access to the computer—an IBM 370/155 under OS/MVT—is managed by a software system the company installed almost three years ago. An evaluation team saw a real need for on-line programming support, but IBM's Time Sharing Option (TSO) was "just too expensive" in terms of computer resources and the demands it put on people, according to technical analyst Earl Ryan.

Ultimately the company acquired Roscoe, the on-line conversational support system from Applied Data Research, Inc. (ADR). This is "one of the most satisfactory packages I've ever come across," Ryan said recently, adding that although it is not completely error free, the problems it has are minor and ADR's support has been excellent.

Simple Procedures

The company found Roscoe's facilities could be used by many operators who are not highly trained technicians. Roscoe Procedures (Rosprocs) written by the technical DP staff have made it possible for clerks to retrieve and enter information without any special commands.

File retrieval, for example, can be accomplished simply by entering the file name. Editing and updating are simplified too, because data called up on the terminal CRT display can be changed in place by typing new data over the old, without rekeying the whole entry, locations, line numbers or other detailed instructions.

Rosprocs have been developed for data validation and for catching gross typing or data errors. If errors are detected, the operator is automatically alerted through the terminal display to make corrections on the spot.

Roscoe, in many instances, has allowed the technicians to write procedures that virtually lead operators through each step of a system. These conversational, self-directing techniques help in getting jobs done quickly, with a significant reduction in costly errors, Ryan said.

Life of Georgia is essentially a Cobol shop with some "miscellaneous" Fortran programs. DYL-260 from Dylakor Software Systems, Inc. is also used extensively and is an excellent product, the analyst added.

Well Received

When Roscoe was first installed it was immediately well received by the insurance company's own programmers, the staff of the company's service bureau subsidiary and by the customers of the service bureau. The support is used in both local and remote mode to create and maintain programs as well as to aid the end user directly through Reprocs, he said.

Virtually every programmer on the company's 370 now uses the Roscoe-equipped terminals rather than the old-fashioned, card-oriented batch processing route, according to Ryan.

"The operating staff is happy with Roscoe," he added, "because there are much fewer cards to handle and match up with their listings. With data set recall, users only have to call up the information they need, key in required changes on the CRT display and send it back again. It has definitely made a big improvement in turnaround time.

"Rosprocs eliminate the need to enter Roscoe commands in any specific order. Rosprocs can change what the user keys in, or reject it or do something entirely different, such as adding extra commands or automatically carrying out various editing capabilities," he said.

"We've developed some rather sophisticated Rosprocs, including one for setting up and generating data sets so that it is simply an operation where the user answers questions presented on the CRT display.

"The Rosproc generates the JCL to do everything the user needs to do. Previously, this was a very error-prone operation and a critical one that had to be completed in a minimum time," Ryan added.

Roscoe is used to simplify many programming procedures such as data set control. Keeping track of disk storage used to be a time-consuming problem and a frustrating one for programmers if their data set was inadvertently scratched. Roscoe is now used to keep an up-to-the-minute record of which data sets are authorized and which are only in temporary file.

Increased Control

This has resulted in an increase in control over the use of disk space without a lot of extra effort. It has also given programmers better control over status of their own data sets.

With a simple call-up procedure, they can find out in seconds where their data set is and whether or not it has been authorized for inclusion in the regular disk file. And managers know their disk files will be kept in order, because unauthorized data sets will automatically be erased after two days.

"We've been using Roscoe to compile Cobol programs for a considerable time now. This is where the real time savings have come in," Ryan added. "Roscoe asks the programmer what he wants to do and then tells him to enter the changes he wants to apply to it, what name he wants to apply to it, what name he wants to call his program—all these types of entries. As a result, turnaround time has been reduced at least 30%. Maintenance changes are faster. And we have virtually eliminated JCL-type errors," he continued.

"Furthermore, editing capabilities are available that would be hard to match with punched cards. Programmers routinely scan through files looking for things that would be nearly impossible to find with conventional card-based desk checking," he said.

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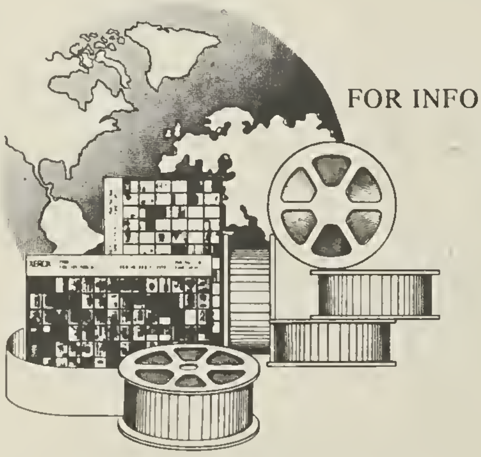

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Single Input Base Lets Divisions Develop Own Forecasting Tools

NEW YORK — Divisions in a diversified corporation should be encouraged to develop their own forecasting tools, as long as they all play in the same econometric ball park.

This is the approach at Union Carbide Corp., which has modified its planning system with an eye toward maximum consistency and credibility of external data on the future of its various areas of business.

The company produces its own comprehensive five-year forecasts, with periodic updates, on domestic and international business conditions and selected industries. It also maintains a data base on macroeconomic and industrial information extending out two years, which can be accessed by interested divisions over the computer time-sharing network of Interactive Data Corp. (IDC).

"While we do not perform product forecasts, we encourage individual operations to develop their own capabilities and we provide them consulting assistance," according to Dr. Neil D. Holden, manager of the Economic Services Department. "The important consideration is that everyone operates from the same economic input so that forecasts throughout the company have a consistent base," he emphasized.

Union Carbide, one of the 25 largest industrial corporations, manufactures chemicals and plastics and products used by metals industries, plus consumer products that include Eveready batteries, Prestone antifreeze and Glad bags. Under a formal goals-oriented management system initiated in 1975, all components of the company have developed interlocking objectives that are in line with corporate goals.

Businesses have been organized into strategic planning units according to present performance and future potential. Strategies for each category are updated at least annually and integrated into long-range business plans.

Runs Models Itself

Although the company relies heavily on general economic forecasting models obtained from outside sources, it runs these models itself in order to inject its own judgment into the variables that are involved. For industrial forecasts it also utilizes its own internally developed models.

A major data source for Union Carbide is Chase Econometrics Associates, Inc., whose services are provided on-line from IDC in XSIM language. Developed by Dynamics Associates, Inc., XSIM is a complete analysis language for financial and economic programming, including modeling, simulation and generation of reports and graphs.

Since it separated from the Management Services department two years ago, Economic Services has concentrated on upgrading its forecasting capabilities. A data base along with special routines has been made available throughout the company, and an educational program on forecasting is being prepared for product planners and other groups.

Credibility Established

"We have established a good and growing credibility on the quality of data we produce and are constantly working toward even further refinement," economist Robert Avila observed. "We also have ironed out many of the production problems in bringing this information together effectively when it is needed."

The next phase of effort, Avila said, is to deliver forecasting expertise into the hands of line managers. "But this is being done on a gradual basis in order to assure it is handled properly," he pointed out.

Any Union Carbide division that wants to can model its activity. It can project its own industry using a different set of assumptions, but these instances are minimized by special industry committees that have been formed to provide a consensus where a number of divisions are involved.

"Economic Services does not focus on any single operation of the company, but acts as an objective force in interpreting external data and spotting important shifts in the broad economic trends," Holden explained.

Long-Range Predictions

Long-range econometric forecasts are run twice a year and results are applied to predictions for individual industries. Because Union Carbide supplies a broad range of raw materials, data must be created on future production of chemicals, metals, capital goods, automobiles and other consumer products. All business areas of Union Carbide receive a copy of the five-year outlook on worldwide business conditions, plus supplementary updates on a quarterly basis.

"Internally, we have shifted many of our programs into XSIM language, including the data base," Avila noted. "We have found it to be an effective and flexible tool, because it was essentially created by an economist for economists and is available on a time-sharing basis," he said.

Currently, divisional econometric forecasting is being carried out in the Chemical and Plastics Group and by the Linde Division which supplies equipment to the oil and gas industry. The Metals Division also is expected to begin modeling its own product forecasts in the near future.

"There is no shortage of opinions about the future of the economy at any given time," Holden said. "But a corporation that has to make decisions now about what it will be doing in the next decade needs the best analysis it can get. And the odds are it will come much closer to the right decisions if it develops the expertise to relate and interpret the impact of external influences on all levels of its activities."

Package Aids Firm's Conversion

(Continued from Page S/14)

Although he hadn't checked statistics recently, the manager noted that for some time DYL-260 was the most frequently executed program in PMC's entire system, including sorts and language processors. That may have occurred in part, he thought, because the Dylakor package is so powerful it has replaced all of the IBM-supplied file-oriented utilities.

"We don't even have copies of IBM's stuff on our core-image library," he said. That saves space as well as adding to the number of times the one package is used during the day.

Advantage of Spooling

While Willis was down on many of IBM's utilities in comparison with DYL-260, he acknowledged that he uses the Power II spooler provided by IBM rather than, for example, Grasp from Software Design, Inc.

He could see the advantage of spooling, he said, so he set up some benchmarks to compare how the products worked in PMC's environment. And Power beat Grasp in that setting even though it cost more in memory to do its work.

The biggest advantage Willis saw in using Power was its ability to handle forms changes. As the printer lines were generated and sent to temporary disk storage, they were flagged with a code to indicate what kind of paper they needed. As printing was done at night, all comparably coded lines were peeled off the spool file so that, for example, all one-ply reports were done before any requiring two-ply paper.

That convenience was well worth the extra 16K memory Power takes, Willis said.

Seattle Bank 'Resolves' Operating System Conflicts

SEATTLE, Wash. — In a rapidly growing operation, it is not only troublesome to do without tools that provide solutions to operational problems, it actually impairs a firm's ability to do business. At least that's what Bill Anderson, manager of technical support and new development for Rainier National Bank here, found when his operation converted from MVT to MVS this past year.

Last year, the bank was operating with two 1M IBM 370/155s under MVT 21.8. This system was operating with shared tape pools. With 245 terminals operating in 33 branches and projections for 750 terminals in 120 branches, "minor" daily problems could really hurt the firm's customer service.

Anderson explained that one of the main problems his people found in the shared disk and shared tape environment was that of job conflicts between the two operating systems. "In a number of instances we would have a pack mounted and indicated as removable," he commented. "If one system came on-line and needed to use that drive, it would remove the pack and replace it with another pack," he said.

"However, the other system could have something dedicated to that pack and drive and because it was not available, it would simply stop or go down. That meant lost CPU time, and MVT didn't provide us with the tools we needed to solve these types of problems," he noted.

"In addition, our people would have indications' that the system was slowing down and becoming sluggish and there was nothing they could do about it," Anderson said. "We needed a way we could solve such problems as enqueue conflicts, reserve lockouts, jobs looping or in a wait state, as well as jobs hung up in the system. And since the banking business is so dynamic and customer-oriented, we needed to solve these and other problems in real-time and online."

Package Sought

To solve his day-to-day operational problems, Anderson purchased Resolve from Boole & Babbage. It provided the tools he and his people needed to improve operational efficiency, resolve system problems, improve system efficiency and monitor critical resources.

With the use of Resolve, Anderson noted that in his disk drive example, he was able to force a pack to be mounted in permanent residence and yet could force it to come down manually when necessary. "In other words," he added, "we were put back in command of the system and were permitted to make decisions based on immediate requirements rather than long-term system efficiency needs."

But the plans were in the wind for even greater expansion of the Rainier system. First the bank installed a 370/158 as an eight-month test of MVS. Then in July of last year a second 158 was brought in to eliminate both 155s and convert totally to MVS on an MP158-III system. Then the firm's DP operation was faced with a whole new set of problems.

"Resolve for MVS wasn't available at the time we made the conversion," Anderson said, "so while we had been solving our problems quickly and easily for a time, we then had to do without the problem solver for an unbearable period. While we were waiting for Resolve-MVS to be released, we were able to document instances where the product would have paid for itself 10 times over. And that was only in a four-month period," he said.

Anderson explained that without Resolve, most of the time a production job was started, they had to start a task to access their production proc library, pull a member out, punch it into an internal reader and then terminate. With the use of Resolve, the internal reader and proc libraries would be permanently allocated so that they could punch in a job directly from an outstanding WTOR and totally bypass the initiation steps.

"In one 26-day period we had to execute IEBEDIT 26,000 times and its sole function was to initiate jobs through the internal reader. That took 18.33 CPU minutes and each with a duration of two seconds. Our average job initiation time is 25 seconds and by eliminating the need to do this manually, we could save 25 seconds per job and a minimum of 25% to 50% of the CPU time."

"In our operation, and I'm certain in most facilities," he continued, "job initiation time is something that can't be accurately costed out to specific cost centers, but by eliminating the started task, we'll be able to save 2,550 seconds per day or 42.5 minutes of job initiation time that can be used for other profitable tasks.

"During a business month, that becomes 1,100 minutes or 19 hours of initiation time where valuable system resources are tied up. With the tools Resolve-MVS provides us, we'll be able to save that resource time and put it to profitable use," he added.

He explained that MVS is very simply a swapping system. It makes decisions about which jobs will run and is governed by the system load at the current time and the performance characteristics of each job. Resolve-MVS provides the tools the user needs to aid in the system's operations.

Anderson also cited four IPLs which occurred during a single month which brought the system to a complete standstill. Regarding the four IPLs, Anderson noted that in each instance they occurred because buffers filled up due to a console going out of service or not being watched carefully enough by the operator.

"In each of these instances," Anderson said, "we had an average seven-minute stoppage. When we are operating at our peak of 750 terminals, that will mean a loss of 5,250 'customer contact' minutes with only one transaction from each terminal. That could be a very expensive seven minutes in terms of total operator time lost and the possibility of losing a customer because of poor service."

Anderson explained that Resolve-MVS will help eliminate this problem because the utility monitors all of the WQE buffers asynchronously. When 75% of the WQE buffers are used, it sends a message to systems operations and shows which console is backing up. Then the operator can take care of the problem and avoid an IPL immediately.

"Our management is very production and customer-oriented, Anderson said. "We made them aware of our problems when Resolve-MVS became available. All we had to do was be the cause for the loss of one customer and we would have heard about it immediately. Our system is too visible to too many people and we need the tools that help us stay out of trouble and ahead of our customers' needs and demands," he concluded.

EVERY NOW AND THEN A DIRECTOR SELLS SOFTWARE TO A DATA CENTER MANAGER

WHEREIN JOE, A DATA CENTER MANAGER (NEEDLESS TO SAY) AND C.J., THE DIRECTOR (EQUALLY OBVIOUS) TRADE DIALOGUE FOLLOWING 'BUSINESS IN THE EAST'...

CJ: Joe, C.J. here.

J: C.J.! Good to have you back. I hope you had ...

CJ: Joe, thanks for handling the office for me. Last time I was gone for a week, there were stacks of messages from users ... that disk space problem, Joe ... I appreciate you smoothing all those feathers. Can't stand talking to programmers.

J: Actually, C.J., I ...

CJ: Joe, listen. I'm looking at this expense request for the DASD and, frankly Joe, I think we're in serious trouble. This will be the second unbudgeted expenditure for disk in the last six months ... we're not planning Joe!

J: C.J., the request is probably not ...

CJ: I know Joe, I know ... we're going to run out again in another three months. Damned engineers ...

J: Well, its not really the engineers, C.J., the Order Entry development project really has used an enormous amount of space and I ...

CJ: Joe, my hands were tied. They knew it wasn't in the budget. What could I do? The business is growing so fast that we just had to get going on the project. J.W. wouldn't listen.

J: C.J., the problem is ...

CJ: Yeah, Joe, we've got to **solve** the problem. What ever became of the Data Management Analyst you hired a couple months ago? Wasn't he supposed to be handling all of this? What's **he** doing?

J: As a matter of fact, C.J., he ...

CJ: I know, I know ... swamped out in the old learning curve. Well listen Joe, I had lunch with an old B-School buddy of mine in Hartford. He's the top D.P. guy for one of the biggest banks in the midwest, and he told me about this software package they bought ... just a second, it's on a card here ... yeah, its called **ASM2** and its marketed by a company called the **Cambridge Systems Group** right here in California.

: C.J., that's what I've been trying to tell you, I ...

CJ: You know about **Cambridge,** right! Well Joe, you may not believe this but the bank had the same problems we have ... standards abuse, data set proliferation, they were absolutely out of control, Joe ... kept adding more spindles, even hired a full-time Data Management group ... incredible, Joe! And you know what? He says that two months after installing **ASM2**, they were back to square one, stabilized, happy users ... you know, he says the users control their own space somehow ... but the real kicker Joe, is that they actually reduced their disk population by 30%! Can you believe it? What do you think, Joe?

J: Well C.J., that's what I wanted to talk to you about over lunch. I know the way you feel about software packages, but, well ...

CJ: I know what you're going to say, but listen. This guy's a businessman. He wouldn't buy anything unless he was sure there was an R.O.I., and he's a stickler for short paybacks. This is a giant bank, Joe, and he says that this package is installed in over **150** installations like his ... big ones, Joe ... he says the support is fantastic and the administration can be handled by clerical folks right in your group, Joe. I think we ought to give it a whirl ... there's a 30-day free trial!

J: C.J., I think that's a **great** idea!

CJ: You do?

J: Sure. And if you'll look in the folder under the **DASD** request, you'll find another for the purchase of **ASM2** ... our 30 days is almost up. There's also an article from the current issue of **COMPUTERWORLD** that describes the product in detail. Also C.J., the reason you didn't have any messages this time is because everybody's happy! And that's what I've been trying to tell you.

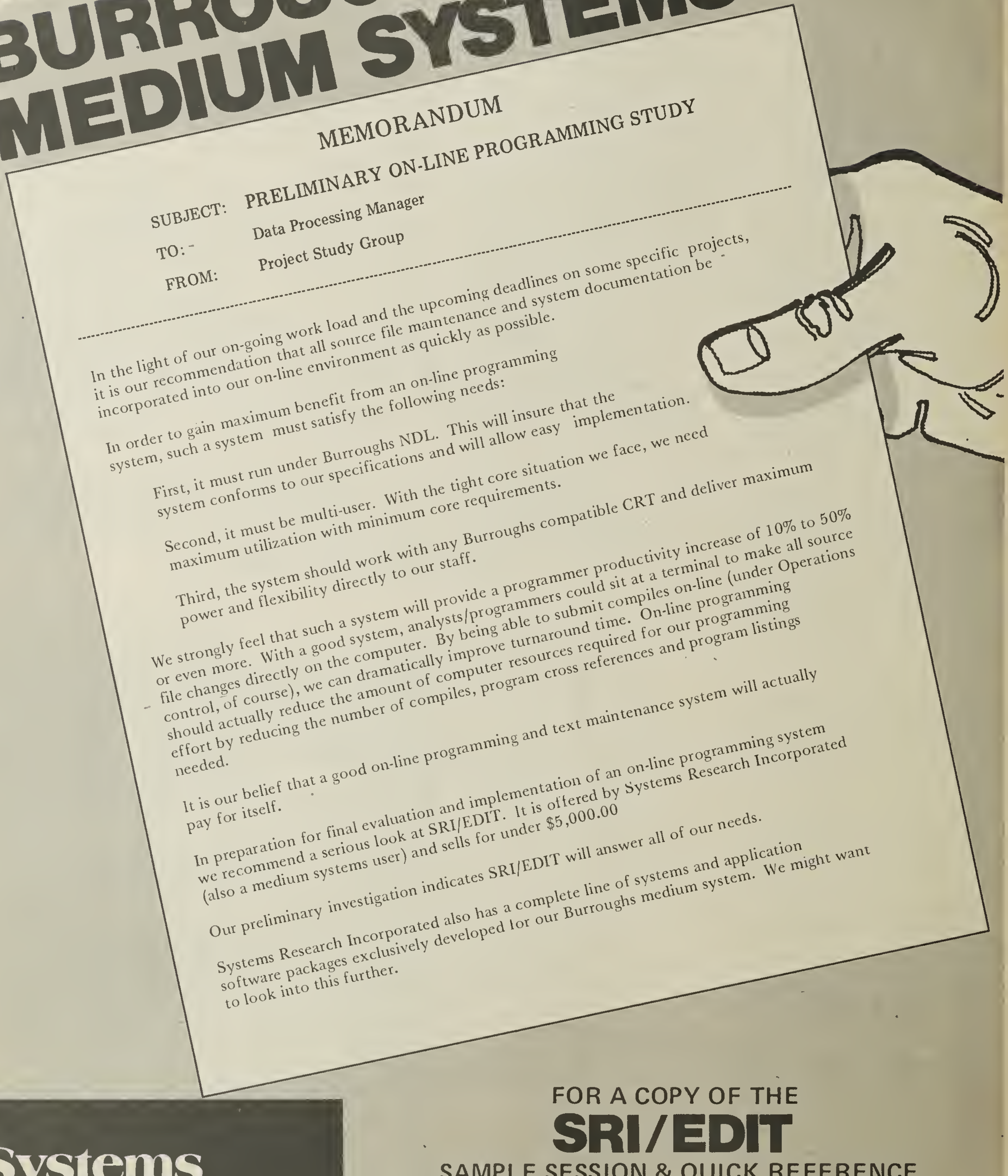
CJ: Joe, you're a hell of a Data Center Manager but you beat around the bush a lot.

J: Thanks C.J., but the ...

CJ: Joe, I agree completely. See you at lunch.

The Cambridge Systems Group
P.O. Box 6267, Stanford, California 94305
(408) 255-5727

to the users of BURROUGHS MEDIUM SYSTEMS:



MEMORANDUM

SUBJECT: PRELIMINARY ON-LINE PROGRAMMING STUDY
TO: Data Processing Manager
FROM: Project Study Group

In the light of our on-going work load and the upcoming deadlines on some specific projects, it is our recommendation that all source file maintenance and system documentation be incorporated into our on-line environment as quickly as possible.

In order to gain maximum benefit from an on-line programming system, such a system must satisfy the following needs:

First, it must run under Burroughs NDL. This will insure that the system conforms to our specifications and will allow easy implementation.

Second, it must be multi-user. With the tight core situation we face, we need maximum utilization with minimum core requirements.

Third, the system should work with any Burroughs compatible CRT and deliver maximum power and flexibility directly to our staff.

We strongly feel that such a system will provide a programmer productivity increase of 10% to 50% or even more. With a good system, analysts/programmers could sit at a terminal to make all source file changes directly on the computer. By being able to submit compiles on-line (under Operations control, of course), we can dramatically improve turnaround time. On-line programming should actually reduce the amount of computer resources required for our programming effort by reducing the number of compiles, program cross references and program listings needed.

It is our belief that a good on-line programming and text maintenance system will actually pay for itself.

In preparation for final evaluation and implementation of an on-line programming system we recommend a serious look at SRI/EDIT. It is offered by Systems Research Incorporated (also a medium systems user) and sells for under $5,000.00

Our preliminary investigation indicates SRI/EDIT will answer all of our needs.

Systems Research Incorporated also has a complete line of systems and application software packages exclusively developed for our Burroughs medium system. We might want to look into this further.

Systems Research Incorporated

Two Forty-One Building
East Lansing, Michigan 48823
Telex: 229401

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Manager, Marketing Services
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Improves System's Performance

Add-On Memory Eases IBM User's Upward Growth

WALTHAM, Mass. — When an IBM user here switched to independent peripherals, increased performance was foremost in its mind. But after two mainframe upgrades, it has found the peripherals' greatest plus is their ability to grow along with the system.

Since the initial installation, Interactive Data Corp. has upgraded its CPU two times and expanded its on-line storage capacity to 7.2 million bytes, according to an Interactive spokesman.

The firm originally stored its data bases on IBM 2314 disk drives which were installed with the company's initial IBM 360/65. The drives were replaced with Memorex Corp. 3660 disk drives at a later date and a comparison of the two functionally equivalent 30M-byte drives was made by Interactive, the spokesman indicated.

"For both performance and general design considerations, we selected the Memorex equipment. The 3660s were exceptionally well designed for operating efficiency and minimum maintenance," the spokesman claimed.

3660s Replaced

The 3660s have since been replaced with Memorex 3670 100M-byte drives which, in turn, are being replaced by Memorex 3675 200M-byte drives, the spokesman noted.

In addition, some of the remaining 3670s will be replaced with Memorex 3650 317.5M-byte drives.

In the same period, the CPUs have gone from the early 360/65 to a 370/158, and finally to the present 370/168, he added.

The 3670/3675s provide an average 10% faster seek time than the IBM 3330/3330-II disk storage facilities which they replaced, according to a Memorex spokesman.

In addition, the Memorex configuration allows additional string switching capabilities, improved diagnostics and a drive status indicator display, he said.

The disk storage configuration now contains six strings of Memorex 3670/3675 equipment which provide 7.2 billion bytes of direct-access on-line capacity. In total there are 24 each of single- and double-density drives installed in Interactive's DP facility.

"Reliability is essential on a system such as ours," the Interactive spokesman explained.

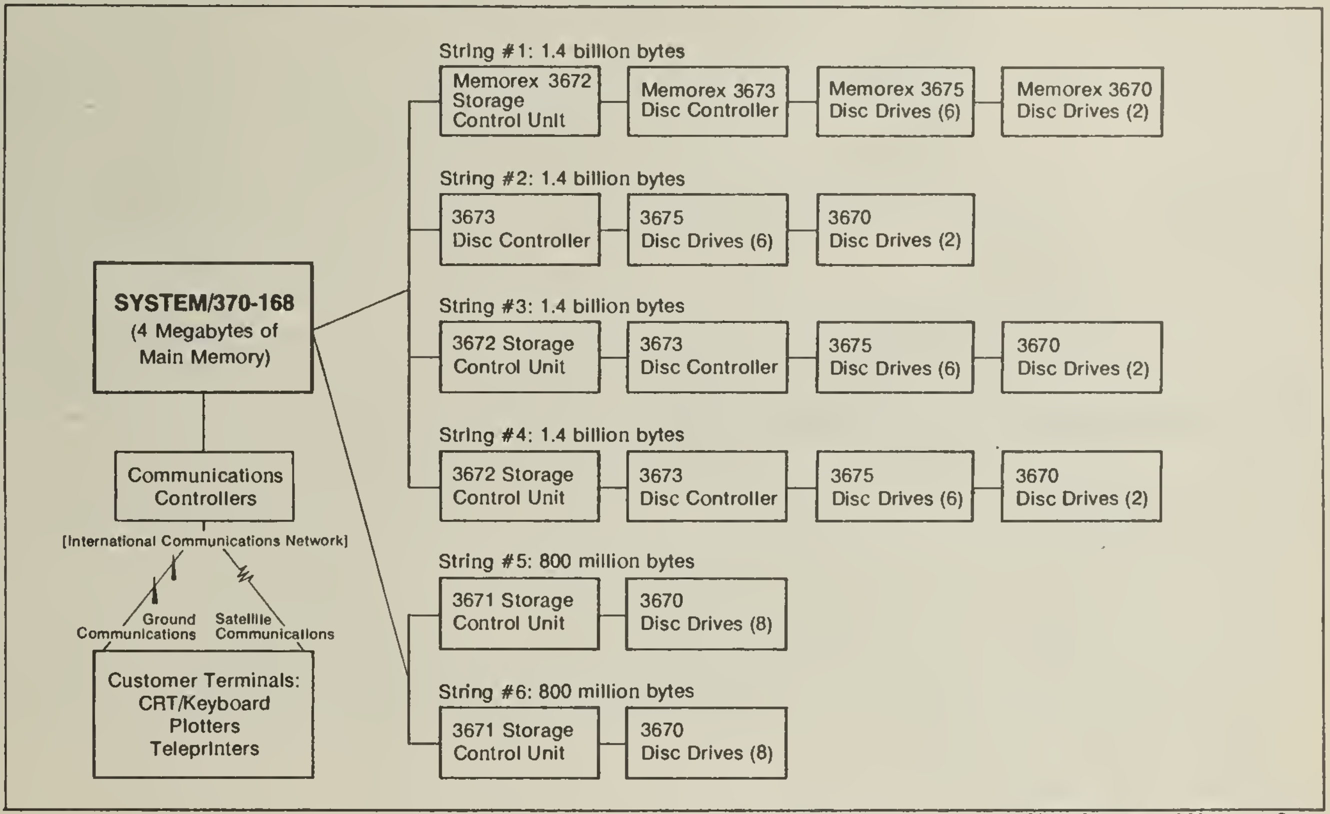
"Our business is dependent upon the instantaneous availability of our data bases. Many of our customers have set up their own proprietary data bases and require on-line access to them at all times," he added.

Interactive provides DP services to customers both in North America and Europe. Each day, the company receives vast batches of data from leading suppliers of stock market and similar information.

The New York and American Stock Exchange daily price information, for example, is transferred into Interactive's data bases in minutes via a 56 kbit/sec CPU-to-CPU communications line, according to the spokesman.

After extensive checking and processing, these data are made available with other re-

(Continued on Page 44)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Satellite Communications
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String #1: 1.4 billion bytes
Memorex 3672 Storage Control Unit
Memorex 3673 Disc Controller
Memorex 3675 Disc Drives (6)
Memorex 3670 Disc Drives (2)
String #2: 1.4 billion bytes
3673 Disc Controller
3675 Disc Drives (6)
3670 Disc Drives (2)
String #3: 1.4 billion bytes
3672 Storage Control Unit
3673 Disc Controller
3675 Disc Drives (6)
3670 Disc Drives (2)
String #4: 1.4 billion bytes
3672 Storage Control Unit
3673 Disc Controller
3675 Disc Drives (6)
3670 Disc Drives (2)
String #5: 800 million bytes
3671 Storage Control Unit
3670 Disc Drives (8)
String #6: 800 million bytes
3671 Storage Control Unit
3670 Disc Drives (8)

Chart Courtesy of Memorex Corp.

Interactive Data Corp. Disk Storage Subsystem

Guide Aids Director in Fire, Security Planning

By Frank Vaughan
Of the CW Staff

MINNEAPOLIS — Fire and security planning are becoming important aspects of the DP manager's job, yet what harried manager has time to become truly knowledgeable about these complex subjects?

"Fire Planning and Security Guide," published by Honeywell, Inc., may assist the DP manager in deciding which type of fire or security alarm system is right for his facility.

The protection of property and personnel has become increasingly important as the size, scope and cost of structures continue to grow, according to the guide.

In one form or another, building security and fire alarm systems are a requirement in almost every type of facility, it noted.

Security Systems

There are five types of security systems in general use today, according to the guide. They include:

- Local alarm systems — where the alarms that are sounded are in the immediate vicinity of the protected area.
- Central station alarm systems — where the alarm signal is relayed to a remote panel located at some centralized facility owned by an outside agency.
- Proprietary alarm systems — where the alarm signal is relayed to a headquarters location owned, manned and operated by the proprietor.
- Direct connect alarm systems — where the signal is carried to an alarm annunciator at a remote location such as a police station.
- Telephone dialer systems — where the signal trips an automatic telephone dialer preprogrammed with phone numbers and messages.

The guide also lists the five general types of fire alarm systems in use today, including:

(Continued on Page 44)

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SALES AND MAINTENANCE OFFICES THROUGHOUT THE US AND CANADA

For Idaho Crops

Irrigation Monitoring Boosting Yields

DENVER — Crop yields in Idaho are being increased an average of 16% through an irrigation program that is monitored by a large mainframe here.

In a test conducted since 1968 by the Department of Interior's Bureau of Reclamation, a Control Data Corp. Cyher 74 is monitoring the irrigation projects in 14 western states.

"By letting the computer tell the farmer when and how much to irrigate, we are making the first real advance in irrigation techniques in the past 25 years," one of the study's supervisors said.

"Some farmers have been irrigating by the calendar and others under fixed rotation schedules; still others irrigate when their neighbor does," he added.

Not only have the crop yields increased under computer control, but about 8% less water has been used by the farmers — helping to conserve the critical water supplies in the West, the supervisor noted.

"To schedule the irrigation by computer, we have to consider many factors," he explained. "We look at the water holding capacity of the soil, effective root zone depth, percolation, climate, rainfall and soil moisture depletion.

"Then too, we have to look at the type of crop. Different crops have different needs at different parts of their growth cycle."

Input Via Terminal Net

All of the information is input to the Denver center by bureau workers through a terminal network. Within 48 hours, the farmer receives a hard-copy printout telling him how much water to use and when to use it over the next 14 days in order to maximize his land's productivity.

The productivity increase is important to the farmers; an average 200 acres in the test area returns an additional $5,000 to its owner in a year's time.

Before the test program was implemented, farmers were wasting 20% to 40% of the water through runoff and deep percolation.

Through careful control of irrigation, the farmers can raise their water use efficiency levels as high as 90% in some cases,

The U.S. has more than 50 million acres of land under irrigation. Buoyed by the results of the tests, agriculturists in the West are discussing the possibility of forming management irrigation companies to commercially duplicate the concepts of the test, according to a CDC spokesman.

OCR Unit Runs at 130 Char./Sec

MOUNTAIN VIEW, Calif. — The Caere Corp. has an optical character recognition (OCR) system that is said to read OCR-A at rates up to 130 char./sec on point-of-sale tags and other documents printed to National Retail Merchants Association Specification A.

Data format can be specified at the time of order; special requirements such as multiple field lines of data up to 36 characters long or changing of data sequence can be factory-programmed, the firm said.

Data editing on the Model 501 is programmed to user requirements and data and control output is through a 10-line parallel interface. An optional RS-232C serial interface is available.

The Model 501 costs $1,495; deliveries are scheduled to begin in mid-year, Caere said from 345 E. Middlefield Road, Mountain View, Calif. 94043.

CPU Canvasses Caves

An IBM 370/125 journeys to the center of the earth to keep track of the location and contents of records from factories to funeral homes stored in more than 100 acres of a limestone cave in Kansas City, Kan., by Inland Vital Records Center.

Bits & Pieces

Ansi Draft Standard Published for Review

WASHINGTON, D.C. — The American National Standards Institute (Ansi) Committee X3 has a draft standard on power control interface for public comment and review.

The proposed standard, BSR X3.68, defines the functional and mechanical specifications which provide a sequential and interlocked means of controlling the power supplied by a mainframe to attached control units, I/O devices, channel frames or free-standing storage frames.

Copies of BSR X3.68 and related correspondence are available for $6 per set from the X3 Secretariat, Cbema/Standards, 1828 L St. N.W., Washington, D.C. 20036.

Unit Notes Disk Damage

CORAL GABLES, Fla. — A device to detect physical damage on a disk pack or disk cartridge has been introduced by American Computer Supplies, Inc.

The accessory works as a visual alarm; a clear detector turns red when the disk has been improperly handled, the vendor explained.

Disk drive head crash from physical mishandling can be prevented through the use of the Pak Alarm, it added.

Pak Alarm is plastic, has a pressure-sensitive backing that adheres to any style of disk cover and sells for $6 from the company at 255 Alhambra Circle, Coral Gables, Fla. 33134.

Versatec Has Printer

SANTA CLARA, Calif. — Quick-Writer 3, a stand-alone printer from Versatec, prints a hyphenated and justified proof page from Redactron or Sperry-Remington cassettes, in 9 sec, the firm said.

The unit produces up to 99 copies of an individual page and collates multiple copies, it added. Hard-copy proofs show hyphenated and justified copy without having to run it through a typesetter.

The $14,500 unit is available from the firm at 2805 Bowers Ave., Santa Clara, Calif. 95051.

Varco Adds Conveyor

BARRINGTON, Ill. — Uarco, Inc. has an accessory forms conveyor for its Model 2010 forms burster.

The conveyor provides uniform stacking in sequence of separated forms.

The conveyor costs $325; deliveries will begin in early fall from the firm at W. County Line Road, Barrington, Ill. 60010.

Topaz Extends UPS Line

SAN DIEGO — Topaz Electronics has added five models to its line of uninterruptable power supplies (UPS).

Added was a 500 VA, 1 kVA, 1.5 kVA and two 7.5 kVA units.

Prices start at $1,900 from the firm at 3855 Ruffin Road, San Diego, Calif. 92123.

KOMAND
BY PACE

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University Uses CPU to Perform 'Fishy' Application

LAFAYETTE, La. — While processing paychecks and performing other administrative tasks, the University of Southwestern Louisiana (USL) here is using its CPU in an effort to solve some of the difficulties of distributing Louisiana crawfish through Europe.

Through this application, USL has determined that a competitive variety of crawfish lacks the market appeal which the bayou-bred type has achieved as a result of its favorable southern environment.

The heart of this system used by USL is a Honeywell Model 68/80 Multiplexed Information and Computing Service (Multics).

Multics' power is distributed to about 1,000 log-ins each day via a network of 27 CRTs in a room designated for student use.

Portable telephone-coupled terminals are used by faculty while a conventional teletypewriter terminal, card reader, card-punch and magnetic tape units are located in the DP center.

"Controls and discipline for our 1,400 different users have been designed into Multics and thus are distributed to the user with the DP," according to a USL spokesman.

"Once our computer center assigns passwords, campus and certain government agencies can equitably use the computer almost any time during the 142 weekly hours it is in general availability.

"This can be done without interfering with other users on the system, who are secure in knowing their confidential information may be seen or used only by themselves," he added.

Monitoring Features

Monitoring features within the system indicate when a particular segment of the university seems to be using more than a previously determined fair share of time.

When individuals use too much time on any of the terminals, the system gives a 10-minute notice before their allotted time is up.

"However, crowding indicates demand for more time on the terminals rather than a shortage of operating system capability since the computing and memory capacity of Multics exceeds our current average day's usage," the spokesman said.

USL's Multics system has 644M bytes of on-line memory, and the system can be expanded with up to three additional CPUs to accommodate more users, according to Honeywell.

Research Emphasized

"USL has chosen a curriculum and equipment that emphasizes extensive research into the science of data processing, systems development and utilization," the spokesman noted.

"Multics is an ideal combination-computer system to help us achieve this end. To use conventional systems on the market today the way we use this computer utility would be inefficient," he continued.

"Large complicated machines require too much sophistication on the part of the typical remote time-sharing campus user which includes the president of the university, the music major and the undergraduate computer science student — all of whom can easily interact with Multics to solve their own challenging problems.

"Conversely, less versatile computers operating on ordinary computing theories and hardware would fail to meet expanded systems design and research needs of computer science department students and faculty. Multics gives our department the optimum computer system to meet both demands, to start students and faculty with conversational programs and then take them into more sophisticated computer languages like PL/I, Cobol 74 and Fortran," he stated.

Since Multics was installed in the fall of 1975, a wide variety of projects have been run that simultaneously have served the athletic department with analysis of football scouting reports based on opponent films and the history department with an economic study of 18th century French provinces; it has also scheduled classes for the university's 14,000 students and run university payroll for hourly and salaried staff.

Add-On Memory Eases User's Growth

(Continued from Page 41)

quested historical information to customers over the company's international time-sharing network, he said.

This network involves both ground and satellite communications with customers utilizing a wide range of I/O devices such as CRTs, plotters and teleprinters.

Typical Connections

Typically, users of Interactive's service connect to the data bases through a local telephone number which puts them in direct hook-up with the CPU via a leased-line minicomputer-controlled communications network.

Once identification and password have been entered and accepted, the user has access to his portion of the disk pack or to multiple user areas, the spokesman said.

Typical users include the planning departments of major corporations for such activities as charting company progress and the economic environment in areas like product line forecasting, competitive analysis and others, he added.

Guide Aids Director In Security Planning

(Continued from Page 41)

Local alarm systems — with immediate vicinity alarms.

Auxiliary systems — the same as a local system, but with a tie-in to the municipal alarm system.

Central station systems — utilizing the independent agency's remote panel.

Remote station systems — having direct signal transmission to a remote location, usually a fire department.

Proprietary systems — owned and monitored by the protected firm itself.

Assists DP Manager

In addition to assisting the DP manager in determining the type of installation best applicable to his situation, the guide discusses the individual types of alarm systems and their purchase and installation prices.

It also describes Honeywell's products in the security and fire planning areas.

The guide is available from the firm at MN12-2118, Honeywell Plaza, Minneapolis, Minn. 55408.

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B80 Users Like Multiprogramming, Ease of Use

By Esther Surden
Of the CW Staff

Ease of use and the system's multiprogramming capability were cited by the first users of the Burroughs Corp. B80 as important features of their systems.

Not surprisingly, the opinion that ease of use was important came from a first-time user, while the view that the multiprogramming feature was the system's highlight came from systems houses tailoring the system to first-time users' needs.

The DP novice — Children's Hospital in Baltimore, Md. — is using the system for patient accounting, according to Charles Bevans, the hospital's director of finance. It soon hopes to have payroll and accounts payable on the system, he added.

Prior to the system's installation in January and its subsequent startup the second week in February, the hospital had been "doing everything manually." The institution looked at both the NCR 499 and the IBM 32, but decided to go with Burroughs after being convinced a programmer would not be needed, Bevans said.

"I don't know the first thing about programming and neither does anyone else here," he added. The programs being run on the system are part of a package supplied by Burroughs, he said.

The B80 is easy to use and learn, he continued. Bevans learned to operate the system in "less than one day," and its ease of operation has made the hospital "very happy" with the system, he said.

Michael Remer, general partner with Medical Data Research in Atlanta, said his company chose the B80 as the basis of a turnkey system it sells to physicians. The system was chosen primarily because of its multiprogramming capability that will give flexibility to the doctor who uses the system, he said.

The company had been using Burroughs equipment — a B700 — as the basis of the turnkey system and is now in the process of converting its software to the B80. It has had no trouble with any of the software and the "operating system is really terrific," Remer said.

Another Atlanta firm, Management Control Systems, Inc., is using the B80 as part of a turnkey system it will sell to certified public accountants. "The multiprogramming feature is significant in an accounting environment," Richard Brock, president, noted.

"Most of accounting is printing and the system is capable of performing multiple print jobs. Multiple processing is also very important," he said. Brock also said the B80 is more economical than others he examined in his quest for a system.

The B80 should be attractive to accountants from a price/performance point of view; "it will fit where the IBM 32 did not," he said.

Because of the firm's previous use of IBM 32 systems for its package, "we are an RPG shop," he said. Conversion from IBM's RPG to Burroughs' RPG was termed "simple".

Although there are some differences between the IBM language and the Burroughs language, they were easily overcome, he indicated.

Real-Time, Multiterminal System

IBM 34 Fills Performance Gap Between 32 and 3

By Esther Surden
Of the CW Staff

ATLANTA — The System 34, IBM's real-time multiterminal small business system introduced here recently [CW, April 18], fills in the performance gap between the batch-oriented IBM 32 and the larger IBM 3.

The system was designed for such use as hospital, governmental, banking and distributor applications, IBM noted.

The System 34's CPU unit contains multiple processors and controllers that can operate in parallel while a main storage processor executes most of the instructions stored in main memory, IBM said. Microprocessors support a portion of the supervisor program; I/O control and controllers drive specific I/O devices, the firm noted.

The system uses Mosfet memory with a cycle time of 600 nsec. Data and instructions are stored as Ebcdic characters; main storage can be 32K, 48K or 64K bytes, according to a spokesman.

I/O and processing tasks are overlapped, he said, except diskette and disk data transfers with other disk reads and writes.

The diskette drive for the system can support either a single- or double-sided floppy disk drive of either single- or double-density format. The double-sided, double-density diskette introduced with the product hosts 9,472 128-character records in extended format, the firm said.

The nonremovable disk storage acts as the main auxiliary storage for the system. Average access time for the 8.6M- to 27.1M-byte disk is 40 msec, the spokesman said.

A workstation controller allows the attachment of up to eight workstations. The workstation has a layout similar to that of the System/32's workstation, IBM noted, with the top row of keys dual-defined to provide 24 programmable command keys.

Twin axial cabling provides the capability to wire each display station directly to the workstation controller or to "short-wire" one or more stations to each other in a cluster and then "long-wire" the cluster to the CPU, the company added.

Communications speeds range up to 9,600 bit/sec for either point-to-point or multipoint, IBM said. The system supports Synchronous Data Link Control (SDLC) via a 3704 or 3705 communications controller equipped with appropriate features.

Support for Binary Synchronous Com-

(Continued on Page 48)

Single-, Double-Density Floppy Fits Shugart Dual-Sided Drive

SUNNYVALE, Calif. — Shugart Associates has a double-sided floppy disk drive available in both single- and double-density versions.

The double-sided floppy stores up to four times the data of a standard floppy drive at a cost of about 25% more, the firm claimed. Either 1.6M bytes unformatted or 1.2M bytes formatted can be accommodated, the firm said.

Called the SA850/851, the unit is plug-compatible with the earlier Shugart SA800/801 standard floppy drive. It is also media-interchangeable with the IBM 3740 and IBM 32 single-sided floppy drives as well as the double-sided media used on the IBM Series/1 and 3600, Shugart said.

The unit reads and writes data on any industry-standard diskette as well as the IBM two-sided Diskette 2 or similar media, the firm said. A dual-index sensor lets the system differentiate between single- and dual-sided floppies.

Transfer rate for the single-density drive is 250 kbit/sec; it is 500 kbit/sec for the double-density unit.

The track-to-track access time is 3 msec while the average access time is 91 msec, the firm said. Latency time is 83 msec.

The floppy drive incorporates the firm's proprietary Fasflex actuator, which uses a flexible metal band for low friction head movement, the company noted.

A redesigned head carriage assembly allows loading of the two read/write heads simultaneously on both sides of the diskette, eliminating the head load pad common on standard single-sided drives, Shugart said. This design reportedly eliminates many causes of unreliability.

The Model SA851, intended for hard-sectored system applications, features a data separator and index/sector separator, the firm noted.

The SA850/851 costs about $750; first deliveries will begin in May, Shugart said from 415 Oakmead Parkway, Sunnyvale, Calif. 94086.

IBM Adds Models to Series/1

ATLANTA — IBM has announced four additional models of the Series/1 along with I/O devices and software enhancements (see Page 25) for the system first introduced in November.

Using the standard 4953 processor, the Model 3C is a half-width unit that can accommodate 32K to 64K bytes of memory in 16K- or 32K-byte increments. The unit has four I/O feature or memory storage slots.

The Model 3D, also using the 4953 processor, is a full-width unit accommodating up to 64K bytes of memory. It has 13 I/O slots.

The Model 5C uses the firm's 4955 processor and provides 32K to 64K bytes of storage in 32K-byte increments. Ten I/O feature slots are available.

Also based on the 4955 processor, the Model 5D can accommodate 32K to 128K bytes of memory in 32K-byte increments. There are seven I/O feature slots available.

The last storage increment in the 5C and 5D can be in 16K bytes, the company noted.

The models use 32K-byte memory card which "increase the configuration flexibility of the Series/1 by requiring fewer cards slots to be used for storage," IBM said. Users therefore have more room to attach I/O cards in the main chassis without having to add another chassis, a spokesman explained.

The 32K-byte storage cards cost $2,425 for the models 3C and 3D and $2,850 for

(Continued on Page 48)

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Minis Help Hospital Perform Pharmacy Application

MEMPHIS, Tenn. — Dual minicomputers in the pharmacy at St. Jude Children's Research Hospital here are helping this institution perform a critical order entry application.

The hospital is a research and treatment center for leukemia, tumor forms of cancer and other catastrophic illnesses afflicting the young. The hospital does not charge for treatment for the 2,600 patients it is currently serving primarily on an outpatient basis.

The hospital's order entry application includes the preparation of drug labels on the dual Datashare 5500 system from Datapoint Corp.

"The preparation of drug labels . . . is only the tip of the iceberg of the work that's performed here," according to Larry Barker, director of the pharmacy section and central sterile supply for the hospital.

"We have an order entry section based on our nine data entry stations for patient medical data and many other applications," Barker said. "We maintain complete patient profiles and histories including all previous drug prescriptions on the two mass storage disks associated with our systems."

The operator/pharmacist at the Datapoint 3600 terminal "can bring up to the unit all relevant records for a patient to determine how a new drug prescription fits into the past treatment once the authorized person has been cleared by the security system for each terminal," Barker explained.

"This enables us, for example, to be on the alert for drug interactions, allergies and any possible contraindications that could develop," he added.

This is important since the hospital often has situations where several doctors are working with the same patient, sometimes from different locations.

With the system, "we have a completely current 'pool' of information on the patient which helps ensure that all prescribed medicines and treatments are right on target," he noted.

The Datashare system uses two mass storage units (soon to be increased to three), each capable of storing up to 25 million char. of information on replaceable disk packs. All operators at the 3600 entry stations have full access to these records via their CRTs.

Labels, once approved, are generated on two printer units and are then used as the basis for prescription fulfillment.

The pharmacy section also has a second Datapoint 5500 system which it uses mainly for batch processing assignments and developmental programming and which also serves as backup to the primary system, Barker said.

Replaced IBM 3s

The two Datapoint systems replaced two IBM 3 Model 6s.

"We were at the point where we had to have additional disks," Barker noted. "We also needed more points of entry."

The hospital considered going to two IBM 3/12s or 3/15s, but the cost of the equipment drove them out of consideration, Barker said.

The only other alternative was the Datapoint systems because the software already developed could only run on either the Datapoint Datashare or the IBM 3, he explained.

File Maintenance

The order entry responsibility in the pharmaceutical section not only includes the preparation of drug labels, but the maintenance of full patient profiles, drug profiles, drug administration histories and charge documentation primarily for cost of operations.

The hospital must maintain cost records on treatments for government and insurance compliance purposes and for listing of drug inventories.

The section also maintains records on patient admission, transfer and discharge for the 48-bed hospital. "The great bulk of our work is done on an outpatient basis, but we do have an important in-house responsibility, too," Barker added.

The primary application software used in the pharmacy section was developed by Gamma Systems Services of Clearwater and St. Petersburg, Fla.

Airports Plan Pilot Test

Mini System Monitors Wind Conditions

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — Six airports across the country will test a minicomputer-based monitoring system this summer to detect the changes in wind speed and direction that plague aircraft takeoffs and landings, according to the Federal Aviation Administration (FAA) here.

The Surface Wind Monitoring System (Swims) will be used to pick up abrupt, low-altitude wind changes caused by thunderstorms and fast-moving weather fronts, the FAA said.

Swims will be installed in May and June in time for the summer thunderstorm season at the six airports — Tampa International, Oklahoma City's Will Rogers, Houston Intercontinental, Denver's Stapleton, W.B. Hartsfield Atlanta Internatinal and New York's J.F. Kennedy.

Using a Digital Equipment Corp. PDP-11/03 or a similar processor, Swims will compare measurements of wind speed and direction obtained by sensors located in the runway approach corridors with wind data collected near the airport center, the FAA explained.

Aural, Visual Alarm

When a significant difference in wind velocity — approximately 15 knots — is detected, an aural and visual alarm is triggered in the control tower cab, alerting controllers to potential wind shear conditions.

Wind shear occurs when wind speed or direction varies significantly with changes in altitude, the FAA explained.

In addition to hearing and seeing alarms indicating wind shear conditions, airport tower controllers will be able to view wind data on a CRT under Swims, the agency noted.

Five or six anemometers, or wind transmitters, will be located atop 20-foot poles at points around each airport.

A radio link will send the data collected by these sensors to the minicomputer.

Once processed, the data will be displayed in the airport control tower, the FAA said.

The agency indicated it is still in the process of acquiring this equipment for the airports. At least three of the sites are expected to employ the PDP-11/03.

Most of the equipment will be purchased off-the-shelf, an FAA spokesman added.

Wind shear conditions are particularly hazardous to pilots during landings and takeoffs because they have little altitude and therefore little time in which to record unexpected wind change, the FAA explained.

Swims will give air traffic controllers better wind information from as many as six points around the airport, the spokesman indicated.

As a result, controllers will have additional time to alert pilots and possibly time to rearrange traffic flows to avoid wind shear situations, the FAA added.

The airports' test of Swims will run up to six months, depending on the length of the summer thunderstorm activity at each site, the agency said.

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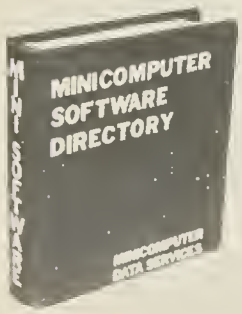

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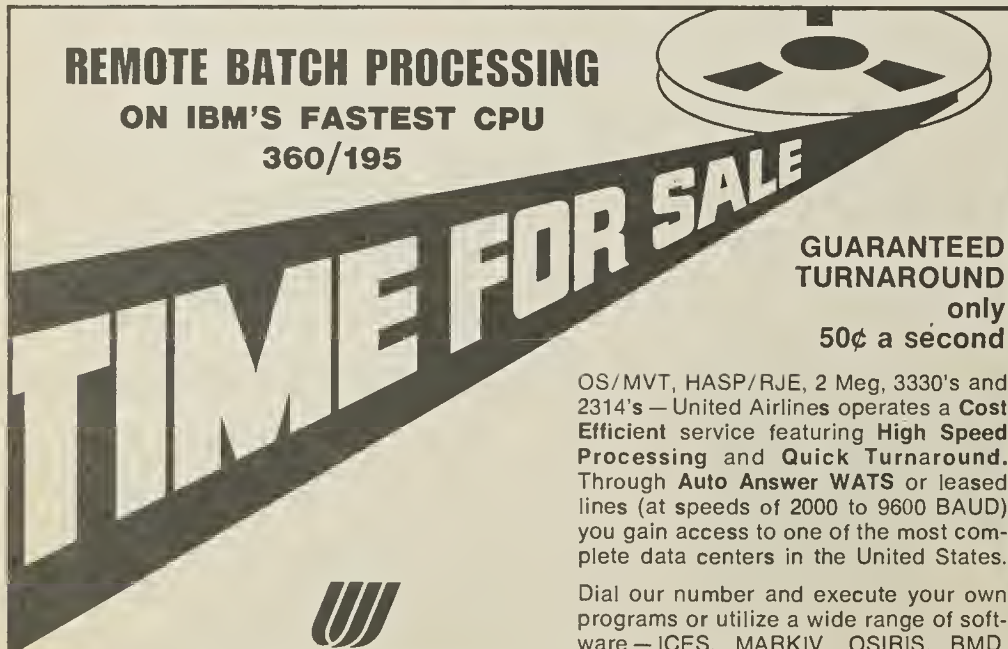

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Mini Bits

Calma Drafting System Based on DG Eclipse CPU

HOUSTON — Calma Corp.'s DDM-100 is a minicomputer-based mechanical drafting system designed to simplify the drafting process.

The system, based on a Data General Corp. Eclipse mini, is said to offer the designer up to six views simultaneously when performing geometry construction. Users can rotate, zoom, blank or unblank any single view without affecting the others, the firm claimed.

A work coordinate system allows the user to perform geometry construction in either model or view geometry; a list of items to be modified can be created along with the work to be done, the company added.

Data is input through function keys on a keyboard or by using a sensitized tablet with an electronic pen.

A system with one workstation, CPU, digitizer and plotter costs about $150,000; a system with six workstations costs about $450,000, a spokesman said. Calma is at 707 Kifer Road, Sunnyvale, Calif. 94086.

GRC Develops T/S System With Multilanguage Capability

HARTFORD, Wis. — General Robotics Corp. (GRC) has introduced a multilanguage, general-purpose time-sharing system based on its GRC11/X3 minicomputer.

The TSX3 system includes a CPU compatible with the Digital Equipment Corp. PDP-11 with 62K bytes of random-access memory; three asynchronous serial I/O ports; a four-drive, double-density floppy disk with direct memory access interface; and a time-shared version of DEC's RT-11 operating system, the firm said. It supports up to 16 users.

The operating system allows users to concurrently log on, share or protect files and do program development while running production software in any language supported by RT-11, GRC claimed.

Options available include cartridge disk, magnetic tape, terminals and printers. Fortran IV, Basic, APL and other language processors are also available, the company noted.

The standard configuration costs $14,995. GRC is at 57 N. Main St., Hartford, Wis. 53027.

Array Signal Processor Developed for Novas, Eclipses

NEWTON, Mass. — Computer Design and Applications, Inc. (CDA) has a block floating-point array signal processor designed for Data General Corp. Nova and Eclipse minicomputers.

The MSP-2 is contained on a 15- by 15-in. plug-in board. It is capable of performing 1,024-point real Fast Fourier Transforms on data resident in Nova memory at less than 7 msec, including I/O, the firm claimed. More than one board may be used, it noted.

The unit performs only the operations defined in its array library, which can be executed either by Fortran subroutine calls or by use of the host computer I/O instructions under Assembly language, a spokesman said.

The unit costs $9,900; OEM quantities are available, CDA said from 375 Elliot St., Newton, Mass. 02164.

HP 97, Lab Instruments Linked

BOULDER, Colo. — Scientech, Inc. has a calculator interface that allows the Hewlett-Packard Co. 97 programmable printing calculator to work with digital laboratory instruments, the firm said.

The system can handle repetitive problems and long calculations, the firm noted. The interface leaves the unit unaltered for manual use elsewhere in the lab, it added.

The unit costs $1,850 from Scientech at 5649 Arapahoe Ave., Boulder, Colo. 80303.

Mini Makes Romantic Job Efficient

HONOLULU — Even the romantic occupation of diving for coral here has become more efficient through the use of a minicomputer.

That's the opinion of Robert Taylor, vice-president of Maui Divers, a company that harvests gold and pink coral from the bottom of the Pacific Ocean six miles off the island of Oahu.

Coral diving is big business, and not only must the firm keep track of the coral it harvests, but it also must keep tabs on the large quantities of black coral it purchases from independent divers.

In addition, it tracks the manufacturing of jewelry using the harvested coral.

Maui Divers' IBM 3 is used to "keep close tabs on the manufacturing process" and do "the best possible job of processing orders and managing inventory," Taylor said.

Each step of the manufacturing and distribution process is under control of the system, Taylor noted.

"In addition to maintaining constant control within our operations in Honolulu, we also provide inventory control for our customers, calculating a required inventory according to each customer's wishes so each maintains a 98% in-stock condition on best-selling items — an industry standard," Taylor said.

As a by-product of tight production and inventory control, Maui Divers' management can see daily which items are in high demand, peaking out or in decline.

"By using the management reports the computer spins off from its routine operations," Taylor said, "we can stay one step ahead of the constant changes in taste of the jewelry-buying public."

Maui Divers' integrated DP applications tie production scheduling, invoicing, sales analysis, bill-of-materials processing, customer and company inventory analysis, purchasing and accounting into a continuous process.

The company began using a small accounting machine in 1969 and installed its own system in 1973. The IBM 3/12 was installed late last year.

"We have cost-justified each step in both applications development and computer acquisition," Taylor said. "We examined the alternatives of manual, service bureau and our own computer processing options and, in addition, analyzed the financial benefits and the intangibles involved.

"In each case, the answer was the same — an integrated data base in our own computer functioning with programming developed by our own staff.

Distributed Units Meet Needs

S&L Implementing Mixed-Vendor Net

By Esther Surden
Of the CW Staff

LOS ANGELES — When Home Federal Savings & Loan of San Diego decided to use minicomputers, it wanted a system that would "be amenable to a mixture of vendors so we could choose the products that best meet our needs," according to Robert Finley, senior vice-president in charge of the DP division.

"In my opinion, the mini's principal advantage is that it provides us with a means of survival," Finley said in a paper presented to the Computer Caravan here recently.

The savings and loan (S&L) went from what Finley described as a "good on-line system" using an IBM 2980 terminal network to the minicomputer-based system. A single CPU represented the only intelligence in the entire older system and performed all the tasks for an unintelligent communications front end, which attached to unintelligent branch controllers. The branch controllers were attached to dumb terminals at workstations.

Home Federal found the system inflexible, Finley said, and in early 1975 put together a plan for a flexible system. In October 1975, management gave final approval for the plan.

The S&L calls its system "Vision" for "Vendor-Independent System Integrating On-Line Networks." It was designed to be modular and portable as well as vendor-independent. The configuration was kept flexible for easy expandability and change, and it was developed to be low-cost, have a low profile and use standard communications.

Now almost complete, the resulting system will have over 400 CRTs, keyboards and other terminal devices along with 250 printers and card readers tied to a hierarchy of minicomputers and microcomputers.

The modules will be connected by four-wire cable to a branch office microcomputer, a General Automation, Inc. GA-16/110. Each micro will connect to eight satellite processors GA-16/440 minicomputers.

A satellite in San Francisco will handle the northern California offices, two in West Covina will handle offices in the Orange County and Los Angeles area and five in San Diego will handle southern California offices.

Took Role of Systems House

When buying the components of its system, the S&L acted like a systems house, Finley said, and was even able to help design some of the equipment.

Vendor independence was "one of the most important aspects of Vision," he said. The S&L was then able to select vendors with exactly the types of products it needed.

Modularity and plug compatibility means the terminals can be replaced easily and moved with a minimum of downtime. And with configuration independence, each component can plug into the branch micros independently.

The interfaces tying the system together are all standard, allowing for substitution or updating of equipment at any time without the need for system modifications, Finley said.

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RDA Mini Based on DEC Micro

BELTSVILLE, Md. — The RD11 from RDA, Inc. is a desk-sized minicomputer using the Digital Equipment Corp. LSI-11 microcomputer.

The LSI-11 emulates the PDP-11/40 and PDP-11/34 instruction set and is compatible with a wide range of standard DEC software, RDA said.

The RD11 features static MOS or core memory, a direct memory access-interfaced floppy disk system and a variety of peripherals including cartridge disk, magnetic tape, card reader/punches, paper tape and word-processing printers.

Software available includes DEC's RT-11 operating system, full macro assembler, Fortran IV, Multiuser Basic, Focal and APL, the firm said.

In addition to a desk model, the RD11 is available in a roll-around, desk-high enclosure or a full-sized equipment rack, the company noted.

A representative system with 56K bytes of static memory, fixed and floating-point arithmetic, dual 1.2M-byte floppy disk, 24-line CRT console, 120 char./sec line printer, enclosure and operating system costs $14,650. RDA is at 5012 Herzel Place, Beltsville, Md. 20705.

RD11 System

Interdata-Type Controller Offered

SAN DIEGO — A 10M-byte disk controller for Interdata, Inc. minicomputers is available from Xcomp, Inc.

The controller is a replacement for the Interdata M46-421 and is software-compatible with the Interdata line of processors, Xcomp claimed.

The unit can be installed in one standard 15-in. selector channel I/O slot and operates with up to four 2,200 bit/in., 2,400 rpm disk drives, the company said.

Data transfers of 310 kbyte/sec can be overlapped with seek/restore operations on other drives, a spokesman added.

The Xcomp DC10 costs $2,800 from the firm at 7571 Convoy Court, San Diego, Calif. 92111.

IBM 34 Fills Performance Gap

(Continued from Page 45)

munication (BSC) is provided via International Communications Association or IBM 2701 or 3704/5 controllers also equipped with appropriate features, the company noted. A single adapter on the System 34 is used for both BSC and SDLC communications.

The System 34 System Support Program (SSP) allows the system to execute System 32 programs in single program mode. The SSP provides job and memory management, data management, operation control language, system utilities, inquiry/resume and Systems Network Architecture functions, the firm said.

RPG-II Supported

RPG-II is supported on the 34; System 32 RPG-II programs can be recompiled on the 34 with minor modifications, IBM stated.

A utilities program product includes a workstation utility said to be a specification language for defining interactive data entry programs to support one or more 5251 display stations. The program also supports a sort, data file utility and source entry utility.

The basic Assembler language "can be used to create a stand-alone program coded entirely by the user with no dependence on any other programming other than the System 34 SSP," IBM noted. The language features mnemonic operation codes, symbolic referencing of storage addresses, automatic storage assignment, address displacement calculation, assembler instructions, cross-reference listings and error-checking and diagnostic messages.

Four Systems Extend IBM Series/1 Line

(Continued from Page 45)

the 5C and 5D. The processors and cards will be available in September.

The Model 3C costs $5,870; the Model 3D is priced at $6,700. The models 5C and 5D cost $7,915 each.

Also announced for the Series/1 was a free-standing impact printer available in two models. The Model 1 prints up to 155 line/min while the Model 2 prints at 414 line/min. Printing speed is 6- or 8 line/in. at up to 132 print position/line.

The printer attachment feature costs $940 and the printer costs $8,625 for the Model 1 and $12,425 for the Model 2. It will be available in September, the firm said.

Enhanced Battery Backup

Battery backup for the system has been enhanced to include capability for 200- to 235 Vac power supplies, IBM noted. The unit costs $1,875 and will also be available in September.

Also introduced was the Model 4978 keyboard display station that has a CRT and a movable keyboard. The display provides 1,920 characters in 24 lines of 80 characters each using a 7 by 8 dot matrix for each character, IBM stated.

Users can program function keys, the firm said. The unit is "variably priced" depending on functional capabilities.

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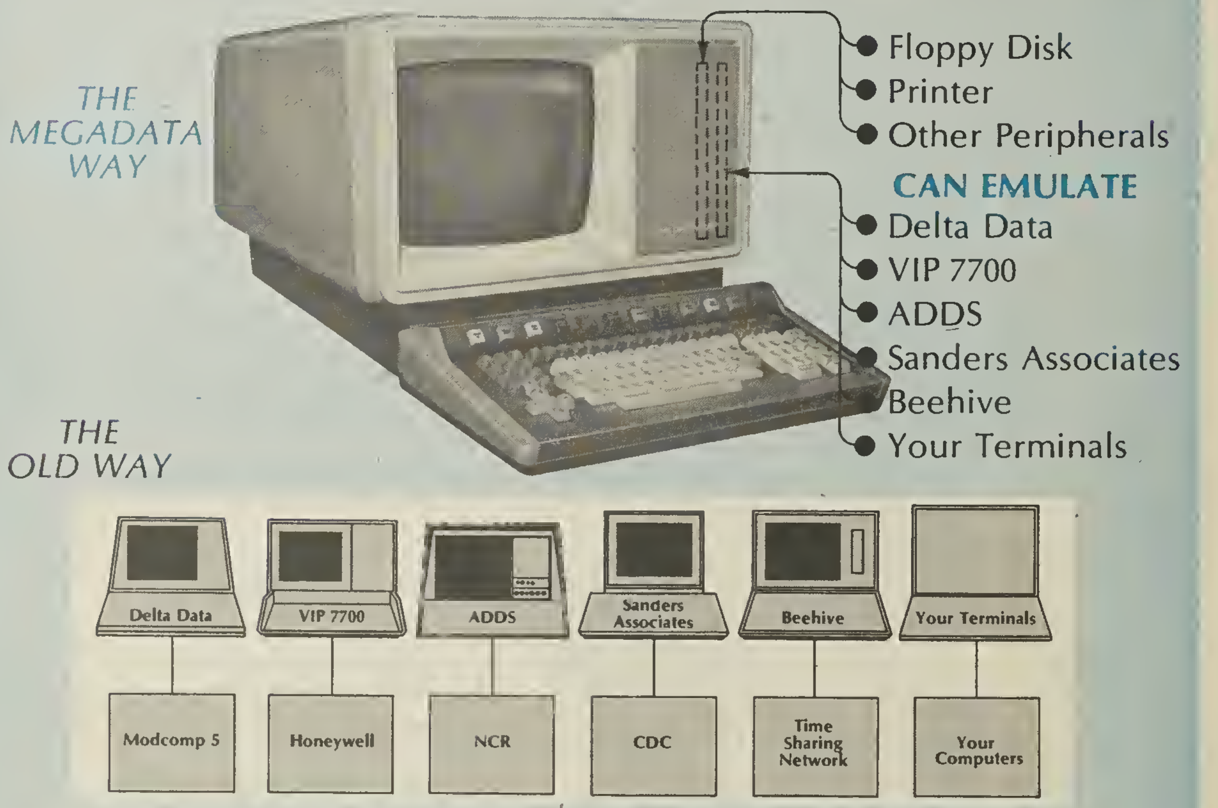

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Cobol on Minis — Part 1

Growth of Cobol: Signal of Trend to Distributed DP?

By Molly Upton
Of the CW Staff

Although Cobol on minicomputers may have been relatively rare a few years ago, many vendors are now offering the language, perhaps signaling the trend toward distributed processing and the need for program compatibility with larger mainframes.

Sources of Cobol vary. Three of the mini makers, Digital Equipment Corp., Data General Corp. and Hewlett-Packard Co., have refrained from offering Cobol on anything smaller than their top-of-the-line minis.

However, at least two vendors are now offering Cobol for the DG Novas, and their sales to systems houses are expanding the number of vendors offering Cobol.

For the mainframers venturing down into the smaller machine market, offering Cobol has multiple benefits. Not only is it attractive to the user, but it enables the vendor to advertise upward compatibility in his line and to stem programming expenditures by standardizing applications packages in one language.

Other manufacturers, such as Four-Phase Systems, Inc., have a product oriented to the distributed processing market and therefore selected Cobol.

In nearly all cases, Cobol has been extended to provide multiterminal, interactive capabilities.

This article is the first in a series focusing on minicomputers. Part I examines systems that can handle Cobol in under 60K. Part II will look at Cobol offered by manufacturers on larger systems.

Several firms have offered Cobol from the inception of certain small products.

When NCR announced its 8200 minicomputer, it also announced Cobol for the machine, according to Keith Lohmuller, formerly manager of advanced software requirements for the Software Division. The NCR Cobol requires 48K bytes on the 8200.

NCR wanted to offer a high-level language because of its supportability as well as the availability of programmers, he said. Cobol was chosen because by definition it is more oriented to business DP, he added.

Compared with Basic and RPG, Cobol is the only language that is standardized, he said.

From a corporate view, offering Cobol on a range of machines enables the firm to develop applications systems that can be transferred to other machines, Lohmuller stated. Demand for Cobol is rising among NCR customers, he said, citing a recent survey of Century users.

NCR's Cobol is "very close" to the American National Standards Institute (Ansi) 1974 version and is categorized by the government as a low/intermediate implementation, he noted. It has some extensions, including those allowing interactive processing, he added.

Offering Cobol on the B80 was a natural move for Burroughs Corp., according to a spokesman there.

The firm instituted Cobol on its L9 system in the '60s; it has been emphasizing the Cobol capabilities of its machines for some time, he said.

Cobol programs written for the B80 can be transferred to larger machines such as the B800, he added.

A B80 with 40K can run Cobol, he said, and a smaller version, the SL5, can emulate Cobol programs written for the L9, he said.

Although Burroughs also offers RPG for the B80, most of the demand is for Cobol, he said.

The firm offers applications programs in Cobol, which could be one incentive for acquiring Cobol. The Burroughs Cobol is "close to Ansi" but has extensions for communications, he indicated.

The firm licenses the Cobol compiler for $25/mo.

Four-Phase Systems has offered Cobol for about four and a half years, according to Frank Marra, marketing manager for software products.

Many of Four-Phase's customers came to the firm because it had Cobol, he said, while others had heard about the system's capabilities.

As Four Phase's on-line simulator and data entry product lines merged, Cobol became a natural, he said. People liked the capability and ease of programming in a data entry type of language, yet wanted to be on-line, Marra indicated.

Most users have Cobol shops now and say they want to standardize on the language, he continued. Four-Phase's Cobol also has extensions to enable it to handle multiple terminals.

There were no problems fitting Cobol on the system, and it can run on as little as 24K bytes, although with that size system "you can't do a whole lot," he said.

Most systems are around 72K to 96K, although there are a fair number of 48K systems with Cobol, he observed.

It's not a batch-oriented Cobol, and it has many capabiities facilitated through the use of overlays, he added.

The communications capabilities enable a user to initiate communications through the Cobol, either IBM 2780 or 3780 or Hasp Model 20 and 2370 discipline, he said. Thus the user can have an interactive Cobol through the mainframe or a batch Cobol system or a batch, transmission system, he added.

For the most part, Four-Phase's Cobol is used in distributed applications, either com-

(Continued on Page 50)

Seeking Decentralization

Kilpatrick Ousted as Calcomp Realigns

By E. Drake Lundell Jr.
Of the CW Staff

ANAHEIM, Calif. — Moving swiftly in reaction to the ouster of Lester Kilpatrick as chairman of California Computer Products, Inc. (Calcomp), new management realigned the firm's sales and marketing operations.

Kilpatrick, a founder of the firm and one of its largest stockholders, was ousted as chairman by the board of directors on April 7 and replaced by George M. Canova, who also serves as president and chief executive officer.

Kilpatrick had been closely associated with the firm's antitrust case against IBM, while the day-to-day management of the company had been in the hands of Canova since June 1976.

When the Calcomp case was dismissed from court, several observers had predicted a management shakeup.

In addition, the observers feel the move might indicate the firm's board of directors was attempting to send a signal to IBM that it might be willing to drop any further pursuit of the case in the appeals courts.

In the marketing realignment following the board's action, OEM and end-user sales responsibility was assigned to major divisional elements — two existing and two newly formed — in a move toward decentralization, according to the firm.

"The realignment is a follow-on to the organizational change of last October "when we announced formation of two main product divisions — Graphics Products and Memory Products — each responsible for its own engineering, manufacturing, quality assurance and product marketing activities, Canova said.

Domestic sales responsibility for all graphics products has been assigned to the Graphics Products Division headed by H. Eugene Brewer, vice-president and general manager.

Heading this sales operation will be James F. Waltz, former western area sales manger. Product marketing, under Jack J. McCarthy, will continue to report to Brewer.

Reporting to Memory Products Division Senior Vice-President and General Manager James Y. Payton will be the Eastern and Western OEM memory sales organization headed by Frank Iazzetta and William Rendall respectively, in addition to the existing product marketing organization under Joel H. Levine.

A new DP Products & Services Division under the direction of Darrell McCollough, vice-president and general manager, has been given responsibility for domestic marketing and sales of the Automated Tape Library and the company's end-user line of plug-compatible disk and tape memory equipment.

The division will also be responsible for all activities of the former Field Engineering Division.

Reporting to McCollough as marketing and sales manager will be Alex Reid who previously was northeast district sales manager for Calcomp.

A new International Division under William O'Brien, vice-president and general manager, was established as a new focal point for all international marketing, sales, service and administration.

The former Calcomp vice-president of sales will be responsible for the marketing of all graphics, OEM memory and plug-compatible product lines outside the U.S. — with expanded emphasis on new business development.

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Caravan Attendance Up 20% to 30%

Health of Industry Reflected by Show Attendance

By Toni Wiseman
Of the CW Staff

LOS ANGELES — If attendance at local DP shows is an indicator of the health of the industry as a whole, 1977 is going to be a very good year.

Attendance at the first two Computer Caravan exhibitions, in San Francisco and here, was up between 20% and 25% over last year.

Not only was attendance up, but so was the quality of attendees, according to a sample of exhibitors, implying that DP budgets are growing and managers are interested in new equipment or upgrades.

Earl Lawrence, account manager for Paradyne Corp., found 15 to 25 good quality sales leads in San Francisco alone, all of which he considers potential sales. "But the proof of the pudding will be when the Caravan closes and the sales either come through or don't," he indicated.

George Woton, sales representative for Graphic Controls Corp., has noticed a surprisingly large number of attendees who have electrostatic printers and can use his product — a specially treated paper.

"This is our first year using the Caravan to contact people, but I think it's going to work out for us if the whole tour is as good in terms of numbers and quality as San Franciso and Los Angeles," he said.

Lee Mulder, director of advertising at Pansophic Systems, Inc., noted the people were coming to the exhibit specifically to talk to his company.

"We've gotten about 40 follow-up type leads in San Francisco, some of which were accounts we were interested in but hadn't been able to see. Now they're coming to us, so we're fulfilling our mission here," he said.

General Datacomm Industries, Inc.'s booth is also getting nonlocal traffic, according to James Mongiello, district manager.

San Francisco was not a very good show because the high management — the decision makers — were in Atlanta at the Interface show, he said. But here, the booth had three times as much traffic in the first day as all three days in San Francisco combined, he noted.

However, in San Francisco, "some people came in from Seattle specifically to see our equipment and that could mean a big order for us," he added.

Jim Felt, systems sales specialist at National Semiconductor Corp., doesn't feel he is seeing the type of customer he'd like — the large OEM buyer. But he has seen a number of systems houses which can mean sales of 50 to 100 systems each, he said.

"I don't know yet whether or not to recommend coming back next year; the sales leads will tell the story. But if we get one good sale, it will pay for the show," he pointed out.

"And, I think we need the exposure. The publicity we are getting is worth the price. I've been impressed by the number of people who come to the show," he stated.

WU Appeals Ruling

WASHINGTON, D.C. — The Western Union Telegraph Co. (WU) has appealed a Federal Communications Commission (FCC) ruling on what services the company may provide through its Securities Industry Communications Service (Sicom) to a federal court in New York.

Sicom, a computer-based information-communications service for the brokerage community, is a private-line network for transmission of information between members of the American and New York stock exchanges and their correspondents.

During 1976, in April and again in November, the FCC found that since four of the six proposed collateral series were actually DP and not combined with the basic Sicom communications network into a single integrated hybrid service, they could only be offered by WU through a separate subsidiary.

Cobol Growth Seen Signal of DP Trend

(Continued from Page 49)

municating interactively or by batch, he said. But since usage is rapidly changing, it is difficult to assign percentages to the interactive and batch use, he added.

The Cobol compiler is bundled with the price of the system, he said.

DEC Down to 32K

The smallest machine on which DEC offers Cobol is the PDP-11/34; Cobol requires 32K, according to Forrest Robinson, senior technical systems for the Business Products Group.

Dibol, a "close cousin" to Cobol, is offered on systems based on the PDP-8 and PDP-11 series, he indicated. Dibol occupies 12K bytes in comparison, he added.

Dibol is the only language offered on the Datasystem 310 and 320 series and is only available bundled as part of the 300 series systems, he stated.

"Most of the 310 users and many of the 320 users are first-time users. The language is relatively easy to understand and thus gets first-time users off to a fast start writing their own programs," he continued.

DEC chose to offer Dibol rather than RPG because it felt Dibol had more power, such as the ability to handle indexed sequential files, Robinson explained.

Dibol handles interactive functions, whereas Cobol is batch-oriented, he added.

When asked if DEC had considered writing other compilers for the PDP-8 and the PDP-11, Robinson observed the firm is "interested in providing tools for the user to get up and going and is not software-oriented per se, but in time it is going to have to address itself more to the software side of the coin."

Although the versions of Dibol running on the PDP-8 and PDP-11 are different, DEC offers a feature that translates one into the other.

DG offers Cobol on its Eclipse, but not on its Nova series, according to David Gilbert, product marketing specialist.

The firm has not addressed itself to the question of whether it will offer Cobol on Novas, he said. "We have a set of resources to allocate to new products, and we try to allocate them where we feel we're going to experience the best revenues," he explained.

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LOS ANGELES — Informatics, Inc., celebrating its first 15 years in business, reported revenues of $58 million in 1976, with over 1,800 employees and facilities and offices throughout the world.

In 1972, when the independent software company celebrated its 10th anniversary, many in the computer industry said its rate of growth may have peaked. With revenues of $18.4 million and 700 employees, it was felt that Informatics, a small company competing in many instances with IBM, should have been satisfied with its ability to survive a two-year recession which had badly affected the stock values of such companies as Computer Sciences Corp., Computer Applications, Computing and Software, Planning Research Corp., Electronic Data Corp. and University Computing Corp.

These experts failed to take into account two major developments of the past five years, according to Walter F. Bauer, president and founder of Informatics.

First, Informatics became a subsidiary of The Equitable Life Assurance Society of the U.S. in 1974, a move which gave it the necessary capital to grow internally, enter the data services market and acquire other software companies such as Programming Methods, Inc.

Secondly, the demand for software products was growing, Bauer said.

Software product revenues for the computer industry as a whole were just under $500 million for 1976, with $1 billion in revenues expected by 1980. This compared with sales of under $100 million in 1970 and makes software products the fastest growing segment of the computer industry, Bauer said.

Mark IV at $50 Million

In eight years, Informatics' Mark IV has sold more than 1,100 installations worldwide. This makes Mark IV the most successful software product of its kind in the industry, with more than $50 million in sales to date, Bauer claimed.

Informatics markets a number of other software products besides Mark IV. At the International Computer Programs' Annual Million Dollar Awards ceremony last month, a number of its products were cited for exceeding $1 million to $5 million in sales.

These included Life-Comm and Issue-Comm for the insurance industry; Production IV, a software system used in scheduling and planning of manufacturing; Minicomm and Intercomm, teleprocessing monitors for communications control; Score, a multifile maintenance reporting system; Accounting IV, a financial applications product; and CSS, a corporate shareholder activity control and reporting system.

Informatics, however, will continue to play an active role in providing custom software services in information-processing and professional services for government, industry and the professions, he said.

In the business world, Informatics has put into operation during the past five years a nationwide communications network which provides a variety of time-sharing and other processing services.

In the area of information services, Informatics develops and manages a number of data bases in the medical, legal and other professions.

The emergence of Informatics from the ranks of thousands of small software companies founded in the '60s to its present status as a multimillion-dollar, worldwide corporation is based on a number of factors, Bauer said. Among these are the continuity of its management; its ability to obtain financial support for growth and development; and its ability to compete successfully in the software products field with IBM and other hardware manufacturers, he said.

Originally a subsidiary of Data Products Corp., Informatics "went public" in 1965 and became independent of that peripheral manufacturer in 1969, when Data Products sold its 60% holdings. By 1969, revenues had grown to $11.5 million with after-tax income of $561,000. In 1974, when Informatics became a subsidiary of The Equitable, revenues had reached $33.1 million.

"Our relationship with Equitable," Bauer said, "enabled us to embark on a plan which includes reinvestment of profits for further development of products and services, along with acquisition of new products and companies."

Informatics has been a spokesman for the growing independent software industry, especially in the area of software products, he noted. In the campaign to get IBM to sell its hardware and software separately, Bauer was quoted in the *Wall Street Journal* and other publications that such "unbundling" would benefit software companies in head-to-head competition with IBM because "IBM is so hardware-oriented it will not be as effective in software."

Small Businesses Exploiting DP More Fully Than Big Ones: Smith

RANCHO BERNARDO, Calif. — In terms of data processing, small businesses have and will continue to get more out of computers than big business, a computer industry executive said here recently.

T.J. Smith, president of Basic/-Four Corp., told a minicomputer industry conference that "since 1971, the small businessman has been using on-line transaction processing which has permitted him to have access to continuously updated files.

"By contrast, most medium- to large-size firms are using systems such as an IBM 370 in a batch processing mode. Consequently, these companies are basing many business decisions on periodic reports that are typically one week to one month old," he stated.

Furthermore, Smith contended, the small businessman will be making even better use of DP in the future because of the increasing availability of low-cost inquiry or convenience terminals located throughout his facility.

"The current trend in DP toward low-cost, expanded disk capacity will enable the small business computer user to maintain all of his customer files online rather than store the information temporarily in disk packs offline," Smith indicated.

"As a result, these firms will actually be exploiting DP much more fully than the medium- to large-size companies that don't have instant access to their files," he said.

F&S Slates Seminar On Marketing RCS

NEW YORK — Frost & Sullivan, Inc. (F&S) will conduct a two-day seminar on marketing to the remote computer services (RCS) industry at the Harvard Club in New York City on May 2-3.

The seminar, entitled "Marketing Strategies for Selling to Users of Remote Computer Services," is designed to convey the essential strategies required to bridge the gap between the RCS practitioners' multivendor service and actual user requirements.

Details are available from 106 Fulton St., New York, N.Y. 10038.

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EMM Begins to Expand Commitments to End Users

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LOS ANGELES — Early in 1976, Electronic Memories & Magnetics Corp. (EMM) started an active program to increase the profitability of its end-user business.

The company concluded that increasing the size of its add-on memory end-user revenues would have a dramatic positive effect on the operations bottom line.

About the time that plans were being formulated to take the necessary steps for expansion, EMM heard the Cambridge Memories, Inc. (CMI) lease base, controlled by CMI's primary banks, was available if the "right" package could be put together.

Why did the CMI lease appeal to EMM?

Added revenue was only the tip of the iceberg. Product credibility was also at the top of the list.

CMI was a company that produced products of similar high reliability. Upgrading CMI products to EMM specifications could be easily accomplished with transparent EMM product enhancements, and they also shared 158 and 168 product compatibility.

With the decision made to go after the CMI lease base, EMM approached the banks, headed by First National Bank of Boston, for their evaluation.

EMM offered a fine service organization that could handle the additional lease base. They could support as well as preserve the integrity of the existing installations. And most important, EMM wanted to expand — not liquidate — the lease base.

EMM's profitability again was a key factor in the discussion. Adding the CMI lease base would enable the company to increase profitability and, therefore, secure its own lease base.

Limited Expense

The CMI lease base would give EMM added products while incurring only limited expense.

The banks found EMM already owned a large lease base; had a good reputation and was one of the leading suppliers of add-on memory; and could upgrade and enhance the CMI lease base.

The banks were also convinced that EMM was committed to the end-user marketplace.

On Jan. 11, it was publicly announced that EMM had completed arrangements to assume the CMI 360/370 memory lease base that was owned by three banks.

Both EMM and the banks transferred their lease bases to a separate company to be managed by EMM.

In closing this deal, EMM increased its lease base approximately 50%. Suddenly, it had the largest installed independent lease base and second only in size to IBM. It needed to adjust quickly and substantiate its claims.

East Coast Facility

An East Coast facility was opened in Bedford, Mass., to refurbish, reconfigure and support the new add-on memory customer base as well as do the same for the company's existing clientele in that area.

"The opening of this fully staffed and equipped facility will ensure our customers the proper support they need in a timely manner — after all, being responsive is an important part of our business," according to Tony Coppola, EMM's national sales manager.

New sales offices were opened in Connecticut, Virginia and Georgia, and seven new salesmen were added in these Eastern offices, the Central region and Europe.

Immediate additions were also made to expand marketing, manufacturing and product support.

Aggressive Goals

With the external moves in full force, EMM turned to the internal side of its business. The acquisition gave impetus to more aggressive product goals. So complete revision of all program plans and marketing strategy resulted. For weeks management literally worked around the clock getting its new act together.

This new leadership position has allowed EMM to become very aggressive. They now possess a large lease base of over 1,000 satisfied customers.

With this marketing attitude and number of satisfied users, the strategy is to make it easy for the customers to upgrade independently on model changes as needed. All the mechanics are ready and the first returns are very encouraging.

"For example, customers who have purchased a 158 memory from us and had a good experience are now looking at upgrading their 168s that are in the same computer center. This goes for 145 customers who also have 158s," Coppola said.

Logically, we hope in time that it will apply across the board when the word really gets out.

"EMM's strategy continues to stress enhancement as a means of providing our user an alternative and maximize the user's investment in a particular model," he added.

Currently, EMM is enjoying the kind of repeat business that is most profitable. These same satisfied customers are using add-on memory for multiple systems and different kinds of computers. EMM is planning to take advantage of this feeling.

"With our dedication and commitment to the memory business, having a large installed base gives us a large captive audience for our new memory products," Coppola said. EMM has closely paralleled IBM, product by product.

EMM has even introduced a Standby Memory which has given the end-user added confidence, and will ultimately back up IBM memory in some models, Coppola stated.

This is the kind of redundancy which ensures a user of memory availability when he needs it, he noted.

The direction continues upward as a large percentage of those bases are long term.

"The combination of CMI acquisition and product investment point toward the company's long-term commitment to IBM-compatible memory," Coppola indicated.

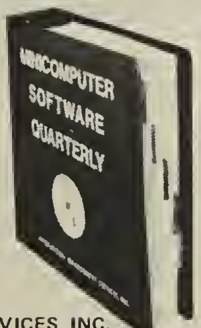
Since EMM is the only company other than IBM to use static random-access memory technology, the residual effect of IBM educating the market has direct benefits to EMM.

Finally, the most important pluses for EMM's end-user business are the company's financial soundness, profitability of that business and desire for growth.

EMM has no debts and an availability of cash. A look at the last financial statement shows an attractive bottom line for the whole company.

The CMI lease base acquisitions do not imply that this is the end of future acquisitions.

"We can and will look at other bases. Our commitment is to the end user and it is to growth," Coppola concluded.



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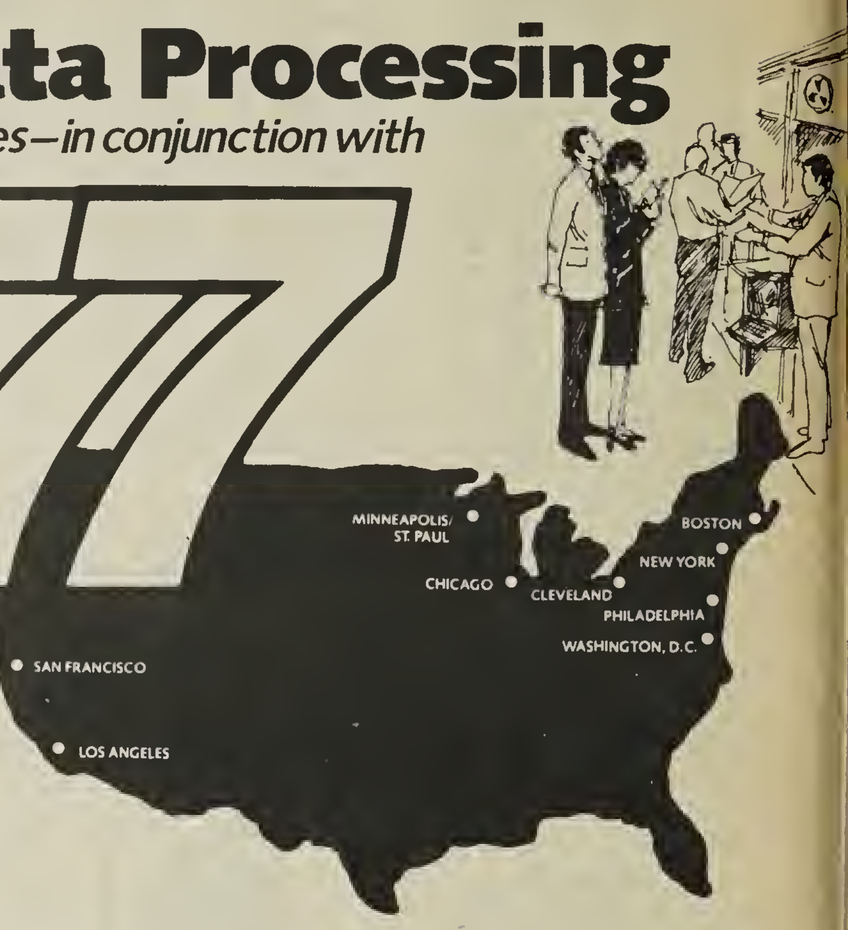

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Terminal Systems Division-Millsboro
NCR Corporation
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DATA PROCESSING OPPORTUNITIES

Cutler-Williams, Inc. has immediate openings, on a permanent or part time basis, in several U.S. Cities, LA, SF, Dallas, Detroit, Houston, Chicago, Miami, Washington D.C., and several more.

PROGRAMMERS

Minimum of 1-2 years experience to include COBOL and/or BAL on 360/370 or comparable computers. Program design, flow charting, documentation, testing and implementation, programs or systems specification conversion.

SENIOR PROGRAMMERS

Minimum of five years experience to include heavy COBOL, PL-1, and/or Mark IV on IBM or comparable computers . . . heavy use of J.C.L. . . . efficient program design for large on-line real-time applications . . . remote testing . . . IMS design.

PROGRAMMERS/ANALS.

Minimum of 2-3 years experience to include heavy COBOL and/or BAL, a good command of J.C.L. systems analysis and user interface . . . the ability to plan, schedule, coordinate and lead development of major business systems with project responsibility. I.M.S. and/or C.I.C.S. highly desirable.

MINI-COMPUTER PROGRAMMERS

Minimum of 2 years experience design and programming in Basic or Assembler language . . . Varian, Datapoint, DEC or comparable mini's desired.

CWI is currently involved in extensive IMS/CICS design and implementation, and is doubling its staff in 1977.

We are THE Leader in the industry in career development, with 3 lucrative salary plans, company paid fringe benefits, and corporate financial stability.

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Forward resume or call Toll Free:
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Midwestern based, young, dynamic, growth oriented mini/micro computer manufacturing company has a solid opportunity if you have:

A minimum of five years experience in original systems software development with an emphasis on supervisor programs, systems support utilities, and I/O drivers. At least two years of successful supervisory experience is also required. This individual will plan, organize, direct and manage a team of 7 to 10 highly competent programmers in the design and development of operating systems software for mini/micro computers. At least a BS in Computer Engineering or Computer Science with MS preferred.

We offer very competitive salary and fringe benefits and are an equal opportunity employer. Send resume and salary history, in confidence, to:

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Responsible individual having a minimum 5 years Data Processing experience with large file applications (3 years programming and 2 years systems design). Candidate should possess strong analytic and communicative skills. Experience in all phases of systems analysis required. Background in accounting, finance, or economics desirable. IBM, ANS-COBOL, Batch and On Line applications environment.

Position offers excellent starting salary based on qualifications and background.

Liberal fringe benefit program including contributory comprehensive group practice health insurance, 12 holidays, 1 month's vacation, employer paid pension plan, university facilities and programs.

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155 Whitney Ave., New Haven, Conn. 06520

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Requires a minimum of five years in manufacturing operations management, including the introduction and use of manufacturing information systems. Knowledge should encompass planning, scheduling, cost control (material planning), production forecasting, product forecasting and performance reporting. IBM 360/370 OS, COBOL experience is a must.

Compensation package is highly competitive. Send resumes and salary history to:

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FACULTY POSITION IN BUSINESS DATA PROCESSING

The Data Processing Department welcomes applications for a faculty position available September 7, 1977. A Bachelors degree required, Masters preferred. Three years business data processing experience is required. Rank and salary dependent upon qualifications. Requires strong interest in undergraduate instruction and ability to teach courses in the following areas: Systems Analysis, Programming Languages, Teleprocessing and Data Base Management. Send complete resume to Professor Stuart J. Travis, Head, Department of Data Processing, Ferris State College, Big Rapids, Mich. 49307.

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HONEYWELL PROFESSIONALS ONLY

If you are a programmer programmer/analyst, systems analyst, or EDP professional and would like the most individualized job search offered in the data processing field today on a local or national level, forward your resume, with present salary and geographical preference, in strict confidence, to:

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Hartford, Conn. 06101

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data processing

PROGRAMMER ANALYST

Consulting engineering firm in Kansas City has immediate openings for programmer analysts. Positions will involve the design and monitoring of computer programs. A computer science related degree along with 2 years FORTRAN and COBOL programming experience is required. Accounting background and DEC-10 experience is preferred. If interested, call or write Les Diehl at (816) 333-4375.

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Responsible for design and programming of an automated management information systems (MIS) with particular emphasis on financial management and integrating newly developed subsystems with existing student information system. Prepare procedures manual. Potential involvement with academic computer science department.

Required: ability to become lead programmer; previous design experience and two years COBOL; accounting background. Prefer person with experience with DBMS within an academic setting.

Send resume to: Ms. Patricia Phillips, Director of Administrative Computer Services, Aquinas College, 1607 Robinson Rd., Grand Rapids, Mich. 49506.

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Personnel with experience in minicomputers, peripherals and their applications in the burgeoning small business computer field. Locations initially in the Orange County and greater Los Angeles areas. Sales locations will be throughout the Western states.

Prospects within this rapidly-expanding company are excellent. Please send resumes, in complete confidence to:

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ANAHEIM, CALIFORNIA 92806

PROGRAMMER/ANALYST

Two programmer/analyst positions at Bucknell University to begin July 1, 1977. One position is in the Administrative Systems area and the other is in the Academic Services area. The minimum requirements for both positions are a bachelors degree with some formal training in computer science. Previous experience with timesharing and batch systems and especially the CP-V operating system on the Honeywell/Xerox Sigma or 560 series computers is preferred. Successful applicants must perform in an environment where the level of responsibility will rapidly increase and the opportunity for professional growth exists. In the Administrative area experience in COBOL and Fortran IV are required. A working knowledge of database systems (DBMS) and the Xerox Assembly language will be considered advantageous. In the Academic area, a good knowledge of Fortran IV is required and it is highly desirable that the candidate be conversant in at least one other higher level language as well as statistical computing. Successful candidates for these positions must be able to interact at a high level with the academic and administrative community. Applicant closing date is May 30, 1977.

Please send resumes to:

Dr. B.D. Gay
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Lewisburg, PA 17837
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First Union Group

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Our rapidly expanding Network Development group has several outstanding openings available to high-caliber contributors. Members of this dynamic team must be able to work independently and possess a thorough working knowledge of assembly language programming plus another high-level language (FORTRAN, COBOL, or BASIC). A BSCS or MSCS with 2-10 years experience in related areas, including testing methods and techniques, is required.

Ideally, you'll be a top technical profession with a background in Network Software Systems Development. Experience on PDP-11s with RSX-11M Operating Systems would be a real plus.

If you can meet these challenging requirements and are ready to assume significant responsibilities with one of the largest and fastest-growing computer companies in the world, please forward your resume, including salary history, in confidence to Joe Hart, Digital Equipment Corporation, Dept. B425, 162 Main Street, Maynard, Mass. 01754.

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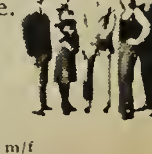

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The successful candidate will have a minimum of 3 to 5 years of programming skills and experience with on-line transaction processing. Knowledge of IDS, communications concepts, structured analysis, and programming techniques would be helpful.

If you are a take-charge individual who is interested in a challenging opportunity, we offer a salary commensurate with job responsibility and an excellent benefit package including pension and savings plan. Paid relocation expenses. Please send resume and salary requirements and history, in confidence, to:

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Will support engineering development projects for maintainability, reliability, and operation, as well as monitor customer product support, generate change orders, and assist in training in-house personnel. Requires a minimum of five years' experience supporting IBM large scale processing systems.

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Will sysgen software to check products, review diagnostic for improved capabilities, and support engineering development. Requires five years experience in supporting IBM operating system software. A working knowledge of hardware is beneficial.

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Will provide support to the system test area in the resolution of system problems and formulation of testing procedures. Requires three years 370/158 main frame test and peripheral device experience. Software knowledge is desirable.

Full relocation is provided to San Diego, plus an excellent benefits package. Interested individuals should send resume and salary history in confidence to Jack Moyer, EXSYSCO Personnel Manager,
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If you qualify, send your resume, with salary history, to:
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E-Systems, Inc.
P.O. Box 6118
Dallas, Texas 75222

PROGRAMMER/ANALYST

Stone & Webster has outstanding career opportunities for Programmer/Analysts. Background should include 2-5 years ANSI COBOL experience for IBM 370 together with JCL. Data base that includes IMS knowledge and/or experience helpful. Assignments will be varied on large information systems using IMS Hierarchical file fstructures. Prior experience with a professional service firm desirable.

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Qualified applicants will assume responsibility for major tasks related to the computerized application of a data information system. Minicomputer and data communications experience desirable. This position may require up to 5-20% travel.

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Qualified applicants will assume responsibility for the design, documentation and implementation of manual applications of a data information system. Micrographics knowledge and ability to interface with computer applications desirable. This position may require up to 5-20% travel.

You will be working in a highly professional environment using modern computer equipment, providing adequate and timely technical support to internal departments as needed. Successful candidates will receive good salaries commensurate with their experience.

Please submit resumes, including salary history, in confidence, to:

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DEPARTMENT - 04
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Candidates must have U.S. citizenship and an appropriate BS degree or higher. Attractive salary, fringe benefits and moving allowances will be offered qualified candidates. And living is a pleasure in the unspoiled Northwest with its many recreational and sports activities and relaxed life-styles.

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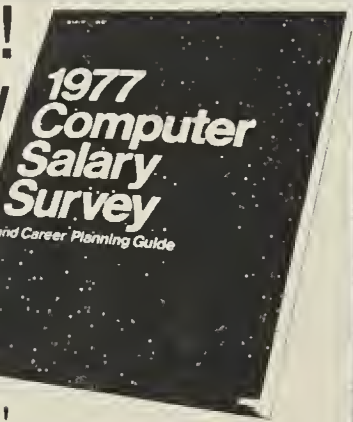

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Washington, D.C.	703/790-5610	Houston	713/626-8705
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Chicago	312/782-0857	Irvine, Ca.	714/833-1730
Oak Brook, Ill.	312/986-0422	Los Angeles	213/386-5500
Cleveland	216/771-2070	Palo Alto	415/328-7155
Detroit	313/352-6520	San Francisco	415/434-2410
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(When writing, please be sure to indicate home address and current position title.)

If unable to call, write:
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721 Enterprise
Oak Brook, Illinois 60521

Programmers

Exceptional full-time career opportunities for programmers experienced with IBM 360/370 DOS. PL-1 experience an asset. Excellent salary and comprehensive benefits package. Send resume including salary requirements to Mr. Peter W. Turner, Personnel Dept.

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This position offers competitive starting salary, liberal benefits package and relocation. Send complete resume, including salary history and requirements to:

Personnel Manager
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Due to rapidly expanding requirements for software development within the GTE manufacturing companies, the following opportunities for software professionals are available:

Software Research Specialist

You will lead a research effort directed toward the development of new languages, software testing and new structured design.

Ph.D. in Computer Science or related field with extensive experience in software engineering software development, reliability and design required.

Software Engineers

You will develop tools and techniques to improve the software development processes for application in real-time control systems, such as control of circuit switches. These tools include design and test languages and software test systems.

A degree is required plus familiairty with real-time or operating systems and structural design concepts. Microprocessor programming experience is desirable.

Computer Aided Design Engineer

An excellent opportunity for a creative professional to work with a Computer Aided Design team developing advanced register level simulation and test generation software for digital circuits. The position involves building a translator for a high level language for modeling the functions of microprocessors and other complex devices at the hardware micro-operation level. The project supports design efforts throughout GTE including the design of Microprocessor based systems and very large scale integrated circuits.

The position requires a degree in Computer Science Electrical Engineering or a related field and experience in developing applications software in high level languages. Work on the development of compilers, simulators or CAD programs and experience with PL/I a plus.

Systems Programmer

You will be responsible for the generation, maintenance and enhancement of a MVS operating system on a 370/168. BS degree plus at least 3 years' systems programming experience on MVT, SVS or MVS operating systems is required. Knowledge of performance measurements is desirable.

Software Technicians

This is an opportunity to work in state-of-the-art software development in a wide range of areas, from real-time control using microprocessors to batch applications on IBM 370/168. Applicants should have experience using PL/M or a similar language in programming microprocessors for real-time applications.

To investigage these opportunities further we invite you to forward a resume or detailed letter including salary information to Mr. Ken Lyman, Personnel Supervisor, Dept. 425-CW, GTE Laboratories Inc., 40 Sylvan Road, Waltham, MA 02154.

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Systems Development

Our newly-formed Commercial Small Systems Group has several attactive openings for individuals who have:

- assembly language programming skills
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- a desire to develop human-engineered user-oriented commercial systems.

You'll be involved with the development of systems that deal with intelligent terminals and networks in a commercial environment. These high-visibility positions offer extensive exposure to diverse new areas.

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Forward resume outlining salary history to Joe Hart, Digital Equipment Corporation, Dept. B425, 162 Main Street, Maynard, Mass. 01754.

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CSC

PROGRAMMER/ ANALYSTS

AIR TRAFFIC CONTROL SYSTEMS

Computer Sciences Corporation is further expanding its System Sciences Division's capabilities by creating additional career growth positions for qualified computer professionals in support of a new project with The Federal Aviation Administration.

Current opportunities exist for individuals with experience in OS/360, ALC (BAL) and/or Jovial, Fortran or Algol in any of the following areas:

Data Base Management
Software Support Tools Development
Real-Time Interactive Design & Implementation
Simulation/Modeling
OS/360 System Generation & Maintenance
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Join our team on the ground floor in the development and implementation of an air traffic control system. The design phase will require assignment in the Washington, D.C. suburban area for appoximately five months and permanent assignment and relocation to Jacksonville, Florida approximately Mid-September, 1977.

CSC offers a liberal relocation policy in addition to a complete benefits package.

For immediate attention, please send resume, or call:

Eva Franklin
Employment Manager
Toll Free: (800) 638-0842

COMPUTER SCIENCES CORPORATION

System Sciences Division
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Silver Spring, Maryland 20910
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Computer Sciences/ Mathmatics

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Temporary full-time faculty position in Computor Sciences/Mathematics at instructor or assistant professor level, September 1, 1977 to May 31, 1978. Responsibilities include undergraduate teaching in computer science and mathematics. Ph.D. in Computer Science (or related area) and/or industrial experience strongly preferred; consideration also given to a person with an engineering background. Rank dependent upon academic qualifications and experience. Send inquiries and vita (including three references) by May 16, 1977 to:

Edward W. Evans
Box EE, 104
Kutztown State College
Kutztown, PA 19530
Equal Opportunity/
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UTAH STATE UNIVERSITY
Director of Computer Services

Utah State University invites nominations and application for the position of Director of University Computer Services. The successful candidate will start around September 1, 1977.

Major Responsibilities: This is a key administrative position directing the data processing center responsible for providing computer applications and data processing services to educational, research and administrative responsibilities; will provide assistance to University and campus establishment of priorities for computer base processing and information system; coordination of University plans and utilization of computer hardware and software services and personnel to support University needs.

Qualifications: Highly responsible management experience in the data processing field, with preference given with experience in a large institution of higher education; experience in hardware and software evaluation and selection; ability to develop, justify and manage large budget; ability to successfully design, implement and operate major systems.

Facilities: The Computer Center through its staff of approximately 26 people and its system, a Burroughs 6700, supplies teaching, research and administrative data processing services to the faculty and staff and 9,000 students.

Utah State University is located in Logan, Utah, a city of 30,000 people, 85 miles north of Salt Lake City and is noted for its recreational activities and scenic beauty.

A letter of application and supporting resume should be submitted no later than May 30, 1977. These documents must clearly demonstrate how the applicant's experience and training correspond to the job qualifications. Please direct all material to: Chairperson, Dr. John M. Neuhold, Wildlife Science, UMC 52, USU, Logan, UT 84322.

DP PROJECT LEADER

Large Southeastern corporation seeks experienced DP professional to lead engineering programming group involved in electric utility transmission and generating planning and power system stability. Must have electrical engineering degree plus five years experience in scientific programming with background in IBM 370 environment. Position requires both administrative and leadership skills. We offer Atlanta location, excellent benefits and competitive salary. For prompt consideration, forward resume with current salary to:

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The Computer and Management Science Department at Arkansas Tech has a nine-month permanent teaching position for an Assistant Professor starting August 22, 1977. Duties would include teaching introductory and intermediate level Computer Science courses and all levels of Quantitative Management Science courses. Minimum Qualifications: Masters degree with appropriate experience, coursework, and abilities. PhD is required. Closing date is May 15, 1977. For information contact:

Don B. Mitchell, Head
Computer and Management
Science Department
Arkansas Tech University
Russellville, Ark. 72801
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field engineering

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Now the phenomenon is widely known. Amdahl's 470V/6 performs as promised. And the company performs as promised: our hardware and software support exceeds the established standards.

Not well known, however, is that this major supplier of large systems is still, in terms of staff size, relatively small. At Amdahl, you're not lost in a sea of people: we began 1976 with less than 400 people and ended it with less than 800. There's still room on the ground floor.

We're looking for above-average talent. You can expect an above-average compensation and benefits package. Please direct your response to Employment Manager, Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, CA 94086. We are, of course, an equal opportunity employer.

Immediate openings throughout the U.S. and Canada. Field candidates will undergo a training period in California on full salary with housing, transportation, and other expenses provided.

FIELD ENGINEERING SPECIALISTS

You will have a minimum of 5 years' experience in maintaining large-scale systems with in-depth training on compatible CPUs. You will have company support in assisting the Amdahl customer in his mixed-vendor environment to maintain full operations in his center. Openings in several major cities and at Amdahl headquarters in California. Please indicate 560-E on your response.

FIELD ENGINEERS

You will carry the Amdahl philosophy of customer service as well as your expertise into the field, utilizing your initiative and talents to aid the customer in restoring computer center operations regardless of the origin of the failure. Large system experience essential, preferably on compatible equipment. Please indicate 567-3E on your response and direct it to the Amdahl regional office nearest you as shown below.

FIELD ENGINEERS: TEMPORARY DUTY IN EUROPE

Immediate openings for field engineers to work at Amdahl installations in Europe as an initial assignment. You will join the permanent field engineering staff, with your first assignment being approximately one year in Europe. Same qualifications as stated elsewhere in this ad for field engineers. Please indicate 905-E on your response.

Amdahl Corporation
1250 East Arques Avenue
Sunnyvale, California 94086

Amdahl Corporation
680 Fifth Avenue
New York, New York 10019

Amdahl Corporation
2021 Spring Road
Oak Brook, Illinois 60521

Amdahl Corporation
22150 Greenfield Road
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amdahl

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What Could be Better...a great job ...with a leading company....and a sunny Florida Location!

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SYSTEMS ANALYSTS

Experience in an advanced project management environment required.

PROGRAMMERS

COBOL or BAL experience required.

In addition to great growth potential, an excellent salary and benefits package, you and your family will enjoy relocation to an ideal area — the kind of place most people hope to escape to but once a year!

LOCAL INTERVIEWS WILL BE CONDUCTED IN MAJOR CITIES

To arrange for a confidential interview appointment with our representative in your area, please rush your resume including salary history and specific area of interest to:

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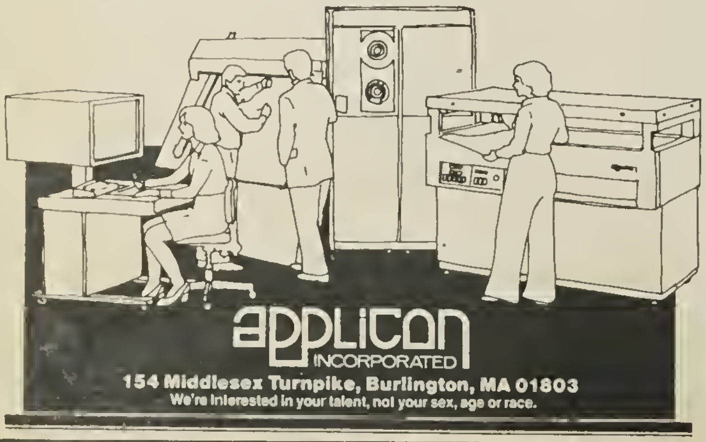
APPLICATIONS/ENGINEERS

If you think in 3D; if you can communicate easily with all kinds of technical people; if you have some design/drafting experience; if you know computers or have some soft-ware experience, if you have all that you can demonstrate our product, provide technical support for our sales staff and help us make the Applicon Graphic System even better than it is now. (You should, of course, have your degree or equivalent experience.)

We're the one company that's been at the leading edge since designers and draftsmen first started sitting down at the computer as well as the drawing board. Therefore, in return for your skills, we offer you a strong salary and a generous benefits package.

Please send you resume and salary history to Gerald A. Heggie.



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Contact Warland Griffith

The PMS Group

Executive Recruitment Division

3900 N.W. 79th Avenue
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Phone (305) 592-3610

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Immediate opportunity for Systems Programmer with two to five experience, within the systems support area of Blue Cross and Blue Shield of North Carolina, located in Chapel Hill. IMS DB-DC experienced desired.

This position offers an excellent opportunity with potential for growth in a progressive organization. Outstanding salary and benefit package. Please submit resume, including salary history to:

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BLUE SHIELD OF N.C.
P.O. Box 2291
Durham, North Carolina 27702

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Requirements:

Good Communications Skills, Network Control or Message Control Software, Systems Programming Experience in one of the following:

- Large Scale Honeywell Systems (e.g. GERTS or NPS)
- Large or Medium Scale Burroughs Systems (e.g. NDL)
- Mini Computer Systems (e.g. DEC PDP-11 "RTOS")

Send Salary Requirements and Resume to:

Management Recruiter
AMERICAN TEL &
TELEGRAPH CO.
Long Lines Dept.
Room 5A115
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AT&T

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communications software development

SAN FRANCISCO PENINSULA

Intel Corporation, the world leader in microprocessor technology, is seeking experienced software professionals for our data communications group. This is your opportunity to play a key role in the design and development of sophisticated multi-processor-based communications systems.

You will work closely with hardware development and use the latest microprocessor components and peripherals. To qualify, you should have experience in one or more of these areas:

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Experience with high-level system implementation languages and the design of operating systems and systems software for micro- or mini-computers plus an MS or PhD in computer science or related field desirable.

For immediate and confidential consideration, please send your resume with salary history to Intel Memory Systems, 1302 N. Mathilda Ave., Sunnyvale, CA 94086. An Equal Opportunity Employer M/F.

MEMORY
SYSTEMS

intel

For the professional with high standards in career and lifestyle

The Ortloff Corporation specializes in the turnkey engineering/construction of processing facilities with a client list of most of the major oil-gas producing companies in the United States, as well as internatinal clients. We have recently installed a Univac 1100/10 system and must continue the staffing of our growing computer center. This center supports subsidiary firms. Our headquarters are located in Midland Texas where you will find many advantages you'd never expect to see and you'll notice that many big city problems are conspicuously absent. If you meet the qualifications stated below we would welcome the opportunity to confidentially explore your career with you.

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Position requires a college degree or equivalent experience and 1 to 3 years experience on Univac 1100 equipment of which a minimum of 6 months must have been spent maintaining Univac 1100 operating system. Must be a proficient programmer in Fortran, COBOL, and 1100 Assembler. Preference will be given to applicants that have completed courses on 1100 operating system, internal design, and systems generation, as well as Univac 1100 operating system dump analysis.

APPLICATIONS PROGRAMMER

Position requires a degree in Computer Science or equivalent and a minimum of 2 years programming experience on a medium to large scale computer system. Must be proficient in Fortran and COBOL. Responsibilities include systems design and programming for both engineering and business applications.

For immediate confidential consideration please forward your resume with salary requirement to: Carl L. Bradford, Director of Personnel

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CPU

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The successful candidate should have 6-8 years of general business experience including computer systems development and implementation. This individual should also have excellent communication skills as well as demonstrated creativity. On-line order entry processing and inventory control knowledge would be a plus. Degree preferred.

SENIOR PROGRAMMER ANALYST

The successful candidate should have 3-5 years of general business knowledge with experience in COBOL, OS, JCL and IMS or CICS as well as good communication skills. Knowledge of on-line order entry/inventory control would be a plus. Degree preferred.

These are career opportunities in an established growth-oriented company. We offer an excellent salary and benefits program, as well as paid relocation. Please send resume along with salary history in complete confidence to:

Joan E. Effort
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Wilmington, Delaware 19897
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PROGRAMMER/ ANALYSTS

NCR Data Processing Division has immediate openings for Programmer Analysts in:

- **MIS Applications Programmer**
- **Software Development**
- **Firmware**
- **Diagnostic Programming**
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(Design/implementation of multi-program O/S in a high level language. Experience desired in data base or telecommunications, distributed processing, virtual machine, time sharing).

Employees will enjoy excellent salary and top working conditions with a commercial employer. Fully paid life, hospital and medical plan for employees and dependents.

To arrange an appointment, please send resume immediately including salary history, training and experience to the Professional Placement Office at the address below.

NCR

Data Processing Division
16575 W. Bernardo Drive
San Diegn, Calif. 92127

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21 SHOESTRING START-AT-HOME COMPUTER BUSINESSES

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We offer assistance in evaluating your present position. Just send your resume and we will call you to discuss your objectives and explain how we might help you reach your goals.

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32 W. Randolph St.
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(312) 346-9400

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Data Base Admin . . . to 30K

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(415) 938-2620

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Investigate user engineering requirements and develop engineering design and support systems for a wide, highly engineered product range. Excellent growth potential in a fast growing environment. Minimum qualifications: BSME, BSCE, BSES, BSAgE, 2 yr. experience in engineering systems analysis, FORTRAN proficiency. Communications skills a necessity. OS experience, CICS, and COBOL are pluses. Send resume and salary requirements in confidence to:

AMCA INTERNATIONAL
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Memphis, Tenn. 38137

EDP AUDITOR

Join one of the most advanced EDP audit units in the country. We're looking for an EDP Auditor who has at least three years experience in data processing. This should include two years EDP audit experience in a large scale data processing environment. Knowledge of system software is helpful. Professional designations are a plus.

We are a major financial services organization, located in Hartford, Conn. Position offers an attractive benefits package, excellent salary and a well-rounded program of professional development. Send resume including salary history to: **CW Box 5000, 797 Washington St., Newton, Mass. 02160.** *Equal Opportunity Employer M/F.*

PROGRAMMER

SENIOR PROGRAMMER

Philips Industries, Inc., a leading manufactuer of products for the mobile home/recreational vehicle/manufactured housing industry has a unique opportunity available.

The JOB-working in a small group is rapidly expanding project situation. Be responsible to do programming required to set up various portions of a MIS System e.g., cost accounting, production control, order entry, etc.

Experience required in COBOL, and O.S. and it is desirable that you have worked with I.M.S. in a manufacturing environment. If you are interested in an opportunity to work quite independently; perhaps get involved in systems work, please send detailed resume to:

John C. Parker
PHILIPS INDUSTRIES, INC.
4801 Springfield St. Dayton, Ohio 45401
An Equal Opportunity Employer

PROGRAMMER/ ANALYST

Our expanding Engineering Department in suburban Chicago has a professional opening for a PL1 programmer. The position will provide experience in both program development and enhancement of existing programs. The successful candidate should have 2-3 years experience and a BS in EE or Computer Science or knowledge of DOS would be helpful but is not mandatory.

Interested candidates are requested to submit a complete resume including recent salary information to Steve Slonkosky, ITT Telecommunications, 2000 S. Wolf Road, Des Plains, Ill. 60018.

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PRINTER ENGINEERS

Computer Peripherals, Inc., the joint venture company of Control Data Corp., NCR Corp. and ICL Ltd. is involved in a major expansion program. We have immedaite openings in the following areas:

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Candidate will have responsibility for hardware/software design and implementation of Microprocessor techniques to peripheral computer controller devices. Applicants for this position must demonstrate experience in:

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- TTL Logic Designs on peripheral equipment
- Intel 8080 Microprocessor family or equivalent

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Experience will include knowledge of microprocessor technology, power supplies, power drive circuitry. Experience directing efforts of other engineers plus technicians is essential. Experience should include budgeting, scheduling of tasks and writing of proposals and specifications.

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Outstanding growth opportunities exist in creative line printer development group for imaginative and creative project leader. Experience should include vibration, stress, structural, dynamic and thermal analysis of electro-mechanical equipment. Responsibilities will also include product definition and generation of product specification. Supervisory experience with engineers and technicians essential.

For all engineering positions above, BS required, MS preferred, plus 2-5 years relevant experience.

We offer competitive salaries and benefits and outstanding growth potential. Please send resume and salary requirements to: Mr. Bob Brown.

COMPUTER PERIPHERALS, INC.
Computer Peripherals
1480 N. Rochester Road CW-15
Rochester, Michigan 48063
1 (313) 651-8810
Affirmative Action Employer M/F

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Computer Peripherals, the nation's leading bandprinter manufacturer, is engaged in advanced development programs which are extending the state-of-the-art in non-impact printers. Our vigorous growth has created immediate opportunities in our Ink Jet and Electrophotgraphic programs for Program Managers, Project Engineers, and design and development specialists in a variety of disciplines. An advanced degree in engineering or physics or a Bachelor's degree with equivalent advanced experience is required, plus the creative ability to develop new directions in non-impact printer tech technology. Talk with us about growth and un-paralleled creative latitude. Your resume and salary requirement will be reviewed in confidence. Please write Mr. Bob Brown.

COMPUTER PERIPHERALS, INC.
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1480 N. Rochester Road CW-15
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1 (313) 651-8810

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Please forward resume, or call (312) 454-8490 to investigate these or other positions.

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Join with us and take advantage of our highly sophisticated IBM 360/158 environment utilizing COBOL and PL/1 and put yourself on the brink of new breakthroughs in systems technology. In return for your technical skills and career enthusiasm we offer an excellent salary and benefits package as well as highly visible advancement opportunities. For confidential consideration, submit letter or resume with earnings history to: Ms. R.C. Rogers, Dept. 900.

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**Arizona Public
Service Co.
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PROJECT MGR - $25K

Pacific Northwest manufacturer seeks individual to interface with upper level management to develop & implement business systems. Will be responsible for objectives, schedules, defining subprojects & supervision of the team. Candidate should know COBOL/FORTRAN, have 4-6 years experience overall systems work. MBA helpful but not necessary.

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Major Northwest firm seeks individual to handle upgrade on equipment & systems. Must have 4 years + analysis & design. Knowledge of COBOL/FORTRAN, minicomputer applications & previous end to end systems work. MBA a +.

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Placement Manager

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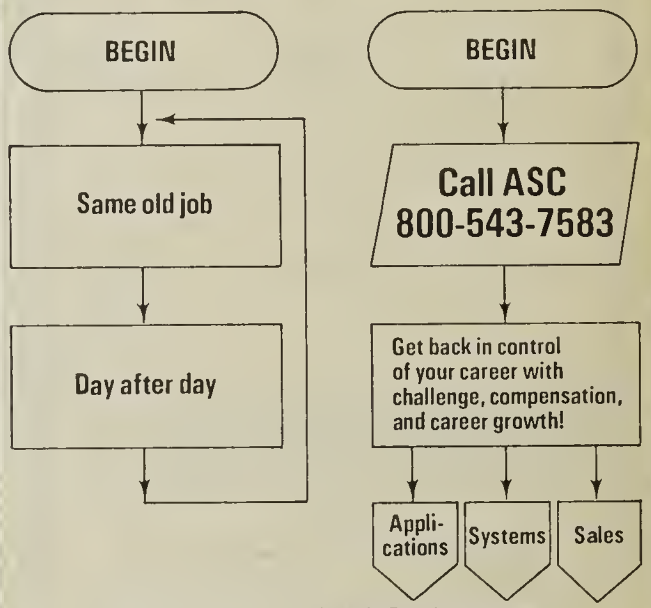
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Systems Engineer
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Extensive knowledge of OS/VS2, JCL, PL/I, TSO, and training, standards, software documentation, systems and programming support: Ability to communicate and instruct. Engineering, mathematics, or physics degree required.

Minimum of 2 years systems engineering experience, with application development and programming, and at least one year of technical support experience preferred. Send resume to: Employment Office

Arizona Public
Service Co.
P.O. Box 21666
Phoenix, AZ 85036

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Position Available: Chairperson, Department of Computer Science, College of Business. August, 1977.
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Qualifications: Doctorate and teaching experience in computer science.
Probable Rank: Assistant professor or associate professor.
Application Deadline: To be considered, application with resume and references must be received by May 15, 1977.
General Information: Southeast Missouri State University is an institution with an enrollment of approximately 8,000 students. College of Business majors typically represent 20 to 25 percent of the graduating class.

The Department of Computer Science is a department within the College of Business. Two degrees are offered: Associate of Applied Science in Computer Science and Bachelor of Science with a major in computer science.
Send Application To: Dr. James R. Briney, III, Coordinator, Search Committee, Department of Computer Science, Southeast Missouri State University, Cape Girardeau, Missouri 63701.

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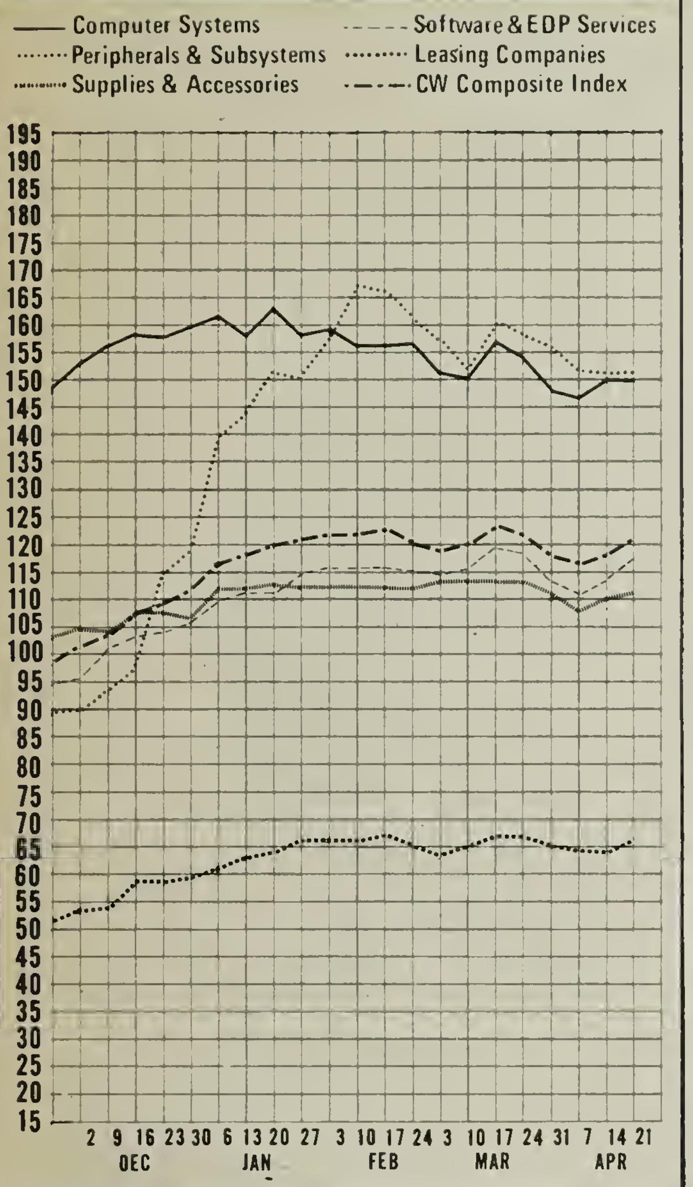

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a-Includes $2,031,000 gain on purchase of debentures plus $7,746,000 from tax credit.

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Three Months Ended Jan. 28

	1977	1976
Shr Ernd	$.01	$.07
Revenue	4,787,335	4,504,433
Tax Cred	21,200	168,300
Earnings	42.792	350,624
6 Mo Shr	.03	.18
Revenue	9,591,377	10,242,223
Tax Cred	61,700	457,200
Earnings	145,379	952,458

PERKIN-ELMER
Three Months Ended Jan. 31

	1977	e1976
Shr Ernd	$.32	$ 28
Revenue	104,157,000	87,081,000
Earnings	5,888,000	5,202,000
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Earnings	10,677,000	8,987,000

a-Restated to include the acquisition of Wangco. Inc. on a pooling-of-interests basis.

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Year Ended Dec. 31

	1976	a1975
Shr Ernd	$.85	$.15
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a-Restated.

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TRADE*QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEONESOAY, APFIL 20, 1977

All statistics compiled, computed and formatted by
TRADE★QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		PRICE 1976-77 RANGE (1)	CLOSE APR 20 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	AMOAHL CORP	23- 40	28 1/4	+ 1/4	+0.8
N	BURFCUGHS CORP	61-108	61	-1 7/8	-2.9
G	CCMPUTER AUTGMATIGN	10- 25	23	- 1/4	-1.0
N	CONTROL OATA CORP	18- 27	22 1/4	+ 5/8	+2.8
N	OATA GENERAL CGPP	38- 60	38	-3	-7.3
G	OATAPGINT CORP	20- 46	20 1/4	-1	-4.7
N	OIGITAL ECUIPMENT	39- 60	40	-1 1/4	-3.0
N	ELECTRONIC ASSOC.	2- 5	2 1/8	0	0.0
A	ELECTRONIC ENGINEER.	7- 16	8 3/4	- 1/4	-2.7
O	FCUR-PHASE SYSTEMS	13- 21	14 7/8	- 1/4	-1.6
N	FCX6CRO	28- 52	51 1/4	- 1/2	-0.9
O	GENERAL AUTCMATION	4- 11	7 1/8	+1 1/8	+18.7
O	GRI COMPUTEF CORP	1- 1	5/8	0	0.0
N	HEWLETT-PACKAPO CO	69-117	73 1/4	- 1/2	-0.6
N	HCNEYWELL INC	34- 56	51 5/8	+3 3/8	+6.9
N	IBM	227-286	270	-3 3/4	-1.3
O	MANAGEMENT ASSIST	1- 9	5 1/2	- 1/4	-4.3
O	MEMOREX	17- 33	25 5/8	- 7/8	-3.3
O	MICROOATA CGRP	7- 28	8 1/4	+ 5/8	+8.1
O	MCOULAP COMPUTER SYS	3- 14	6 7/8	+ 1/2	+7.8
N	NCR	24- 38	34 3/4	- 1/2	-1.4
O	PRIME COMPUTER INC	4- 18	13	-1 1/8	-7.9
N	PERKIN-ELMER	18- 27	18 1/8	+ 1/8	+0.6
N	RAYTHEON CO	45- 67	62	+3	+5.0
N	SPERRY RAND	35- 52	35 3/8	+ 5/8	+1.7
O	SYCOR INC	8- 31	8 1/4	-1 3/8	-14.2
A	SYSTEMS ENG. LABS	5- 10	6 1/4	+ 7/8	+16.2
N	VARIAN ASSOCIATES	12- 19	18 5/8	0	0.0
A	WANG LABS.	11- 20	14 3/4	-1	-6.3

LEASING COMPANIES

EXCH		PRICE 1976-77 RANGE (1)	CLOSE APR 20 1977	WEEK NET CHNGE	WEEK PCT CHNGE
C	BOOTHE CCMPUTER CORP	1- 10	10	- 1/8	-1.2
O	CCMOISCO INC	3- 13	11	+ 1/2	+4.7
A	CCMMERCE GROUP CORP	2- 3	2	0	0.0
A	CCMPUTER INVSTRS CRP	1- 3	1 1/8	+ 1/8	+12.5
M	OATRONIC RENTAL	1- 8	1	0	0.0
A	OCL INC	1- 2	1 1/4	0	0.0
N	DPF INC	5- 8	6 5/8	- 1/8	-1.8
N	ITEL	6- 16	13	- 5/8	-4.5
N	LEASCC CORP	6- 22	22 3/8	+2 7/8	+14.7
O	LEASPAC CORP	0- 1	3/4	- 1/4	-25.0
C	NFG INC	0- 1	1/8	0	0.0
A	PIONEER TEX CORP	6- 11	8 1/8	- 1/8	-1.5
N	U.S. LEASING	7- 12	11 1/8	- 1/8	-1.1

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIOWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BIO PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EOP SERVICES

EXCH		PPICE 1976-77 PANGE (1)	CLOSE APR 20 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	AOVANCEO COMP TECH	1- 3	7/8	- 1/8	-12.5
G	ANACOMP INC	6- 11	8 1/2	+1	+13.3
A	APPLIEO DATA RES.	2- 7	5 1/2	- 1/8	-2.2
N	ALTCMATIC DATA PROC	17- 35	25	0	0.0
O	COLEMAN AMEPICAN COS	2- 6	1 7/8	0	0.0
O	CCMPU-SERV NETWORK	3- 15	12 1/2	- 3/4	-5.6
O	COMP ELECTIGN SYSTMS	5- 9	8 3/4	+2	+29.6
O	COMPUTER HORIZONS	1- 2	1 1/4	0	0.0
C	CCMPUTER NETWORK	2- 8	5 3/4	0	0.0
N	CCMPUTER SCIENCES	4- 9	7 5/8	+ 1/4	+3.3
O	CCMPUTER TASK GPOUP	1- 2	1 1/4	0	0.0
C	CCMPUTER USAGE	2- 6	2 1/8	+ 1/8	+6.2
C	CCMSHARE	2- 9	5	0	0.0
O	OATA OIMENSIONS INC	2- 5	4 1/8	0	0.0
O	OATATAB	1- 2	2 1/8	+ 1/8	+6.2
N	ELECTRGNIC OATA SYS.	12- 19	17	+ 1/2	+3.0
O	INSYTE CORP	1- 3	1 3/4	+ 1/8	+7.6
O	IPS COMPUTER MARKET.	1- 2	3/4	0	0.0
O	KEANE ASSCCIATES	2- 4	3 5/8	+ 1/2	+16.0
O	KEYDATA CCRP	1- 5	2 1/8	- 1/4	-10.5
A	LOGICON	3- 16	13 5/8	-1 1/4	-8.4
A	MANAGEMENT DATA	1- 3	1 1/8	- 1/8	-10.0
A	NATIONAL CSS INC	13- 25	20 3/4	+ 3/4	+3.7
O	NATIONAL CATA CORP	4- 7	5 1/4	0	0.0
A	ON LINE SYSTEMS INC	17- 23	18	+ 1/8	+0.6
N	PLANNING PESEAPCH	3- 5	3 5/8	0	0.0
C	PROGRAMMING & SYS	1- 1	7/8	+ 1/8	+16.6
O	RAPIOATA INC	2- 5	2 1/8	+ 1/4	+13.3
O	PEYNCLOS & REYNOLO	13- 21	18 1/4	+1	+5.7
O	SCIENTIFIC COMPUTERS	1- 2	2 3/8	+ 1/2	+26.6
O	TYMSHARE INC	14- 28	17 1/2	+ 1/4	+1.4
A	UKS SYSTEMS	3- 5	4 1/8	- 1/8	-2.9
N	WYLY CORP	1- 7	1 1/2	+ 1/8	+9.0

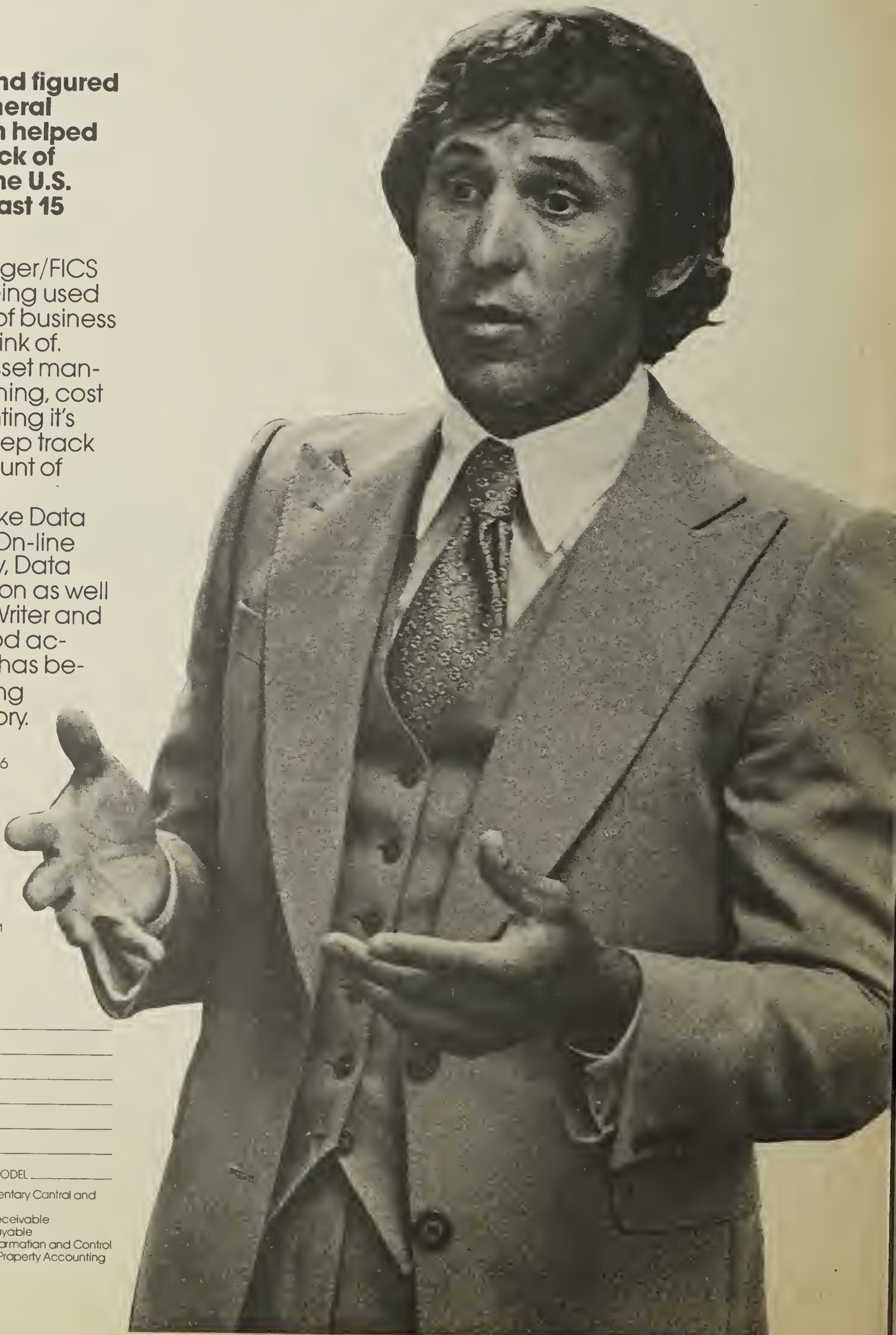
PERIPHERALS & SUBSYSTEMS

EXCH		PPICE 1976-77 PANGE (1)	CLOSE APR 20 1977	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADORESSOGPAPH-MULT	8- 14	11	- 1/4	-2.2
C	AOVANCEO MEMORY SYS	4- 10	7 1/4	+ 1/4	+3.5
N	AMPEX CORP	5- 10	8	- 3/8	-4.4
O	ANOERSON JACOBSON	2- 4	3 1/2	+ 1/8	+3.7
N	APPLIEO OIG OATA SYS	10- 25	11 1/4	0	0.0
O	BEEHIVE MEOICAL ELEC	3- 12	10 1/4	- 1/8	-1.2
A	BOLT,BERANEK & NEW	7- 11	7 1/4	+ 3/8	+5.4
N	BUNKER-RAMO	5- 12	11 1/4	+ 3/8	+3.4
A	CALCCMP	3- 7	3 1/8	+ 3/8	+13.6
O	CAMBRIOGE MEMCPIES	0- 6	3/4	- 1/8	-18.6
N	CENTRONICS OATA CGMP	20- 36	24 3/4	+ 1/2	+2.0
C	CCOEX CORP	22- 47	45	+ 3/4	+1.6
C	CGGNITRONICS	1- 1	7/8	0	0.0
C	CCMPUTER CGMMUN.	1- 6	5	0	0.0
O	CCMPUTER CONSOLES	4- 7	5 1/4	+ 3/4	+16.6
A	CCMPUTER EOUIPMENT	1- 3	2 5/8	0	0.0
O	CCMPUTER TRANSCEIVER	1- 3	1 1/8	0	0.0
C	CCMTEN	4- 13	11 3/8	+ 3/4	+7.0
N	CGNRAC CORP	20- 27	27 1/4	+1 3/8	+5.3
O	OATA ACCESS SYSTEMS	1- 5	5	- 1/4	-4.7
O	OATA 100	6- 13	7 1/4	+ 1/8	+1.7
A	OATA PRCOUCTS CORP	5- 15	10	0	0.0
O	DATA TECHNOLOGY	1- 3	2 3/4	+ 1/8	+4.7
O	OATUM INC	1- 2	1 1/2	0	0.0
O	OECISION OATA CCMPUT	1- 4	1 7/8	+ 1/8	+7.1
O	OELTA OATA SYSTEMS	1- 1	3/8	0	0.0
N	ELECTRONIC M & M	1- 5	4 3/8	+ 1/8	+2.9
O	FABRI-TEK	1- 2	1 1/8	- 1/4	-18.1
O	GENERAL CCMPUTER SYS	0- 2	1/2	0	0.0
N	HAZELTINE CORP	4- 12	9 3/4	- 3/8	-3.7
N	HARRIS CORP	27- 39	37 5/8	+ 1/4	+0.6
A	INCOTERM CORP	9- 20	13 1/4	- 1/2	-3.6
O	INFOREX INC	3- 7	5 3/4	+ 1/8	+2.2
O	INFORMATIGN INTL INC	10- 18	12	+ 1/4	+2.1
O	INTEL CORP	44-109	44 1/2	+ 1/2	+1.1
A	LUNOY ELECTRONICS	3- 7	5 1/2	+ 1/8	+2.3
O	MSI OATA CORP	3- 8	7 1/2	+ 1/8	+1.6
N	MOHAWK DATA SCI	3- 10	5 1/4	- 3/8	-6.6
O	PENRIL CORP	1- 4	4 1/2	+ 1/8	+2.8
A	PERTEC CORP	3- 9	7 1/8	- 1/8	-1.7
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISIGN INST.	2- 10	2	0	0.0
O	OUANTOP COPP	4- 6	4 3/8	0	0.0
O	RECOGNITION EOUIP	6- 11	7 5/8	+ 1/8	+1.6
O	SCAN OATA	1- 4	1 1/2	+ 1/4	+20.0
O	STOPAGE TECHNOLOGY	9- 13	10 3/4	+ 1/4	+2.3
O	T BAR INC	5- 10	9 1/8	+ 1/8	+1.3
G	TALLY COPP.	4- 6	4 7/8	- 1/4	-4.8
O	TEC INC	3- 9	8	+1	+14.2
N	TEKTRONIX INC	45- 69	60	+ 3/4	+1.2
N	TELEX	2- 5	2 1/2	- 1/8	-4.7
O	WILTEK INC	1- 2	1/4	+ 1/8	+100.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1976-77 RANGE (1)	CLOSE APF 20 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	BALTIMORE BUS FORMS	2- 5	2 3/8	0	0.0
A	BARRY WRIGHT	6- 13	12 1/2	+ 1/8	+1.0
C	CYBERMATICS INC	0- 1	1/2	0	0.0
O	OUPLEX PRCOUCTS INC	13- 24	15 3/4	- 1/2	-3.0
N	ENNIS BUS. FORMS	6- 8	6	0	0.0
O	GRAHAM MAGNETICS	8- 14	12 1/2	- 1/4	-1.9
O	GPAPHIC CCNTROLS	13- 19	15 1/2	+ 1/2	+3.3
N	3M CCMPANY	49- 66	50 3/4	0	0.0
O	MCGRE CORP LTO	31- 51	31	- 3/4	-2.3
N	NASHUA CORP	11- 20	18	+1 1/2	+9.0
O	STANOARO REGISTER	15- 22	21 1/2	+1 1/2	+7.5
O	TAB PROOUCTS CO	5- 17	16	+ 1/4	+1.5
N	UARCO	19- 25	20 1/4	+ 1/2	+2.5
A	WABASH MAGNETICS	4- 14	12 3/4	+ 1/8	+0.9
N	WALLACE BUS FORMS	18- 25	17 3/4	- 1/8	-0.6

"You should have seen the look on my face"



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